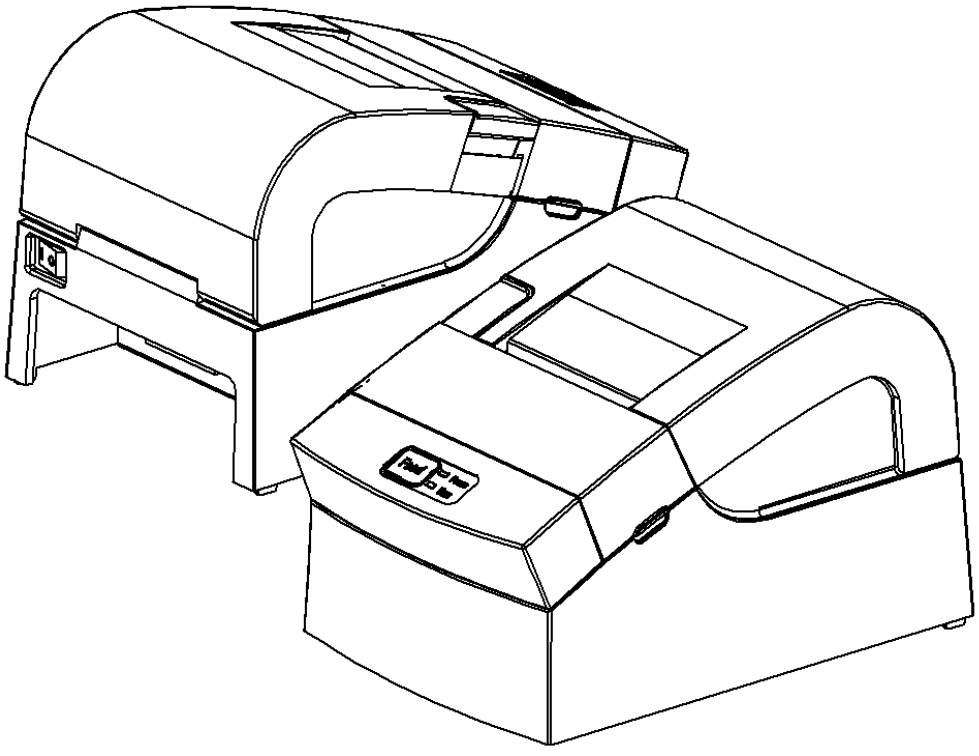
BIXOLON®

Service Manual

SRP-150

Thermal Printer

Rev. 1.02



http://www.bixolon.com

■ Table of Contents

1. Precaution Segment 4
1-1 Safety Precautions 4
1-2 Servicing Precaution 5
1-3 Precaution for Electrostatically Sensitive Devices (ESDs) 6
1-4 Operational Precautions 6

2. Installation and Operation 7
2-1 Installation 7
2-1-1 AC Adapter Installation 7
2-1-2 Interface Cable(P,S) Installation 7
2-1-3 USB Cable Installation 7
2-1-4 Cash Drawer Cable Installation 7
2-1-5 Cover Open Installation 8
2-1-6 Paper Roll Installation 8
2-2 Operation 9
2-2-1 Setting the DIP switches 9
2-2-2 Setting the DIP switch (RS-232C Serial Interface) 9
2-2-3 Setting the DIP switch (IEEE1284 Parallel, USB2.0 Interface) 9
2-2-4 Setting the Memory Switches 10
2-2-5 Hexadecimal Dumping 12
2-2-6 The self Test Mode 12

3. Product Specifications 14
3-1 Appearance 14
3-1-1 Printer Dimensions (mm) 14
3-1-2 Feature Locations 15
3-2 General Specifications 16
3-3 Thermal Printer Specifications 16
3-3-1 Printer Specification 16
3-3-2 Character Specification 17
3-3-3 Paper Specification 17
3-3-4 Reliability and Environment Specification 17
3-3-5 Printable Area 18
3-3-6 TPH (Thermal Printer Head) Specification 18
3-3-7 Other Component Specification 19
3-4 SMPS Specifications 19
3-4-1 SMPS (Switching Mode Power Supply) Specification 19
3-4-2 SMPS Output Connector 19
3-5 Interface Specifications 20
3-5-1 RS-232C Serial Interface 20
3-5-2 IEEE1284 Parallel Interface 22
3-5-3 USB2.0 Interface 24
3-6 Cash Drawer Specifications 27
3-6-1 Drawer Cable 27
3-6-2 Cable Connection 27

4. Hardware 28
4-1 Wiring Diagram 28
4-2 Block Diagram 30
4-3 Special Circuit Descriptions 32
4-3-1 Power Circuit 32
4-3-2 RESET Circuit 33
4-3-3 Cash Drawer Circuits 34
4-3-4 RS-232C Communication Block Diagram 34
4-3-5 Parallel Communication Block Diagram 35
4-3-6 USB2.0 Communication Block Diagram 36
4-3-7 DIP Switch Circuit 36
4-3-8 Thermal Printer Head Circuit 37

5. Disassembly and Assembly 39

6. Maintenance 42
6-1 Maintenance 42

7. Troubleshooting 43
7-1 Power Problem 43

1. Precaution Segment

1-1 Safety Precautions

1. Be sure that all of the built-in protective devices are replaced. Restore any missing protective shields.

2. When reinstalling the chassis and its assemblies, be sure to restore all protective devices including: nonmetallic control knobs and compartment covers.

3. Make sure that there are no cabinet openings through which people – particularly children - might insert fingers and contact dangerous voltages. Such openings include excessively wide cabinet ventilation slots and improperly fitted covers and drawers.

4. Leakage Current Hot Check:
   WARING: Do not use an isolation transformer during this test.
   Use a leakage-current tester or a metering system that complies with American National Standards Institute (ANSI C101.1, Leakage Current for Applications), and Underwriters Laboratories (UL Publications UL1410, 59.7).
   With the unit completely reassembled, plug the AC line cord directly into a 100VAC or 240VAC outlet of the Adaptor.
   With the unit's AC switch first in the ON position and then OFF, measure the current between a known Earth ground (metal water pipe, conduit, etc.) and all exposed metal part, including: metal cabinet, frame, and screw-heads and printer. The current measure should not exceed 0.1 milliamp. Reverse the power-plug prong in the AC outlet and repeat the test.

5. Design Alteration Warning:
   Never alter or add to the mechanical or electrical design of the ECR. Unauthorized alterations might create a safety hazard. Also any design changes or additions will void the manufacture's warranty.

6. Components, parts and wiring that appear to have overhead or that are otherwise damaged should be replaced with parts that meet the original specifications. Always determine the cause of damaged or overheating and correct any potential hazards.

7. Observe the original lead dress, especially near the following areas: sharp edges, and especially the AC and high voltage supplies. Always inspect for pinched, out-of-place, or frayed wiring.
   Do not change the spacing between components and the printed circuit board. Check the AC power cord for damage. Make sure that leads and components do not touch thermally hot parts.

8. Product Safety Notice:
   Some electrical and mechanical parts have special safety-related characteristics, which might not be obvious from visual inspection. These safety features and the protection they give might be lost if the replacement component differs from the original-even if the replacement is rated for higher voltage, wattage, etc.
   Components that are critical for safety are indicated in the circuit diagram by shading, ( )or ( ).
   Use replacement components that have the same ratings, especially for flame resistance and dielectric strength specifications. A replacement part that does not have the same safety characteristics as the original might create shock, fire or other hazards.

1-2 Servicing Precaution

WARNING 1: First read the Safety Precaution section of this manual. If some unforeseen circumstance creates a conflict between the servicing and safety precautions, always follow the safety precaution.

WARNING 2: An electrolytic capacitor installed with the wrong polarity might explode.

1. Always unplug the unit's AC power cord from the AC power source or the Power Switch off before attempting to:
   (a) Remove or reinstall any component or assembly,
   (b) Disconnect an electrical plug or connector,
   (c) Connect a test component in parallel with an electrolytic capacitor.

2. Some components are raised above the printed circuit board for safety.
   An insulation tube or tape is
   sometime used. The internal wiring is sometimes clamped to prevent contact with thermally hot components. Reinstall all such elements to their original position.

3. After servicing, always check that the screws, components and wiring have been correctly reinstalled.
   Make sure that the portion around the serviced part has not been damaged.

4. Check the insulation between the blades of the AC plug and accessible conductive parts (example: metal panels and input terminals).

5. Insulation Checking Procedure: Disconnect the power cord from the AC source and turn the power switch
   ON. Connect an insulation resistance meter (500V) to the blades of the AC plug.
   The insulation resistance
   between each blade of the AC plug and accessible conductive parts (see above) should be greater than 1 mega-ohm.

6. Never defeat any of the B+ voltage interlock. Do not apply AC power to the unit (or any of its assemblies)
   unless all solid-state heat sinks are correctly installed.

7. Always connect an instrument's ground lead to the instrument chassis ground before connecting the positive lead; always remove the instrument's ground lead last.

1-3 Precaution for Electrostatically Sensitive Devices (ESDs)

1. Some semiconductor (solid state) devices are easily damaged by static electricity. Such components are called Electrostatically Sensitive Devices (ESDs); examples include integrated circuits and some field-effect transistors. The following techniques will reduce the occurrence of component damaged caused by static electricity.

2. Immediately before handling any semiconductor components or assemblies, drain the electrostatic charge from your body by touching a known earth ground. Alternatively, wear a discharging wrist-strap device. (Be sure to remove it prior to applying power-this is an Electric shock precaution.)

3. After removing an ESD-equipped assembly, place it on a conductive surface such as aluminum foil to prevent accumulation of electrostatic charge.

4. Do not use freon-propelled chemical. These can generate electrical charges that damage ESDs.

5. Use only a grounded-tip soldering iron when soldering or unsoldering ESDs.

6. Use only an anti-static solder removal device. Many solder removal devices are not rated as anti-static; these can accumulate sufficient electrical charge to damage ESDs.

7. Do not remove a replacement ESD from its protective package until you are ready to install it. Most replacement ESDs are packaged with leads that are electrically shorted together by conductive foam, aluminum foil or other conductive materials.

8. Immediately before removing the protective material from the leads of a replacement ESD, touch the protective material to the device will be installed.

9. Minimize body motions when handling unpacked replacement ESDs. Motions such as brushing clothes together, or lifting a foot from a carpeted floor can generate enough static electricity to damaged an ESD.

1-4 Operational Precautions

1. The heating element of the printer mechanism's thermal head and the driver IC are easily damaged. Never allow these components to come into contact with metal or other hard objects.

2. Never touch the printer mechanism's heating element with your hand. Doing so can damage the heating element and affect proper operation.

3. The head and motor areas are very hot during and immediately after printing. Do not touch components in these areas directly with your hand.

4. Do not use any paper other than these specified in this manual otherwise print head reliability and print quality are affected adversely.

5. Thermal paper starts to color at around 70ºC. Take care to protect unused and printed thermal paper against the affects of heat, light and characters on the paper to feed.

6. Take the roll paper out of the printer when you will not use the printer for a long time in a high temperature and humidity environment.

BIXOLON is continually making improvements to enhance the function and quality of the product. For this reason, the specifications of the product and manual contents are subject to change without prior notice.

2. Installation and Operation

2-1 Installation

2-1-1 AC Adapter Installation

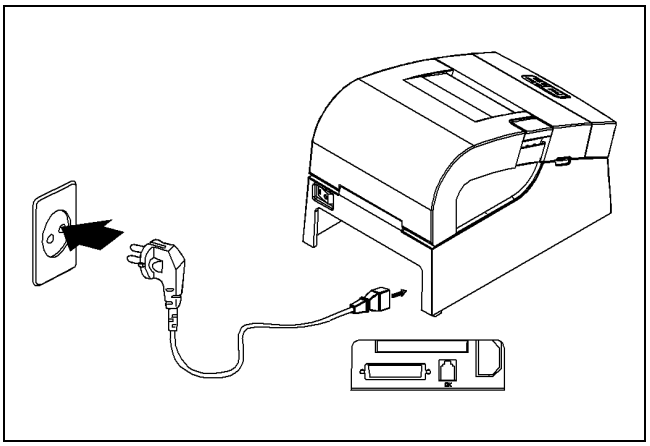


Figure 2-1-1. AC Adapter Installation

1. Mack sure the printer is turned off with the side of the switch.
2. Plug the power cord into the SMPS on the printer.
3. Plug the AC Adapter power cord into the wall outlet.

2-1-2 Interface Cable(P,S) Installation

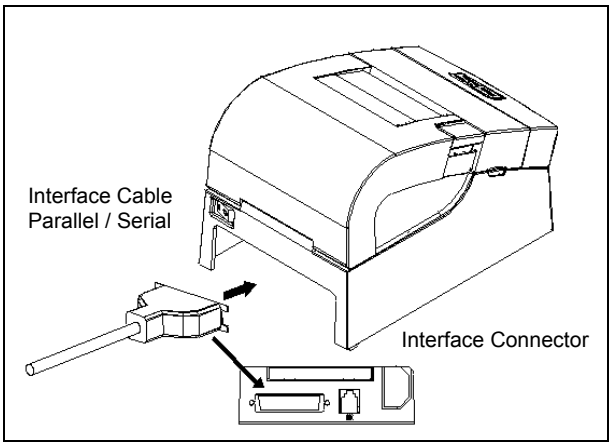


Figure 2-1-2. I/F Cable Installation

1. Turn off the printer, host ECR and Computer.
2. Plug Serial(RS-232), or Parallel Cable connector into the I/F connector on the printer.
3. Turn on the printer, host ECR and Computer.

2-1-3 USB Cable Installation

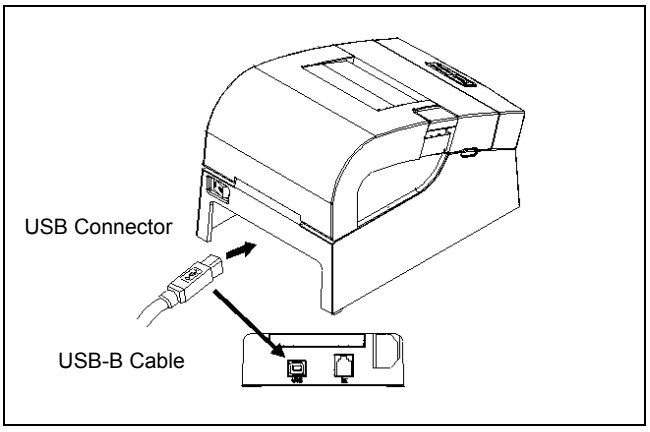


Figure 2-1-3. USB B-TYPE Cable Installation

1. Turn the printer off.
2. Plug USB cable connector into the connector on the printer.

2-1-4 Cash Drawer Cable Installation

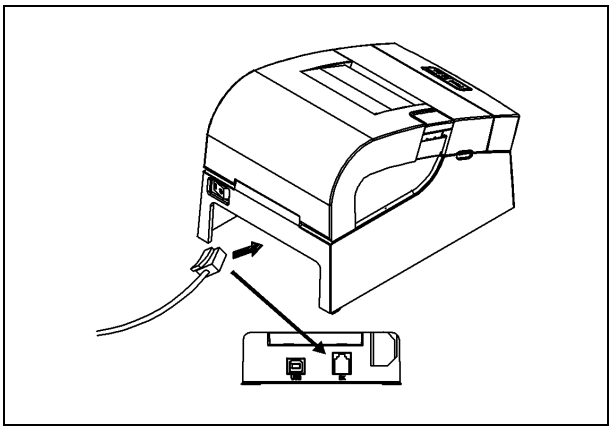


Figure 2-1-4. Cash Drawer Cable Installation

1. Turn the printer off.
2. Plug the cash drawer cable connector into the connector on the printer.

2-1-5 Cover Open Installation

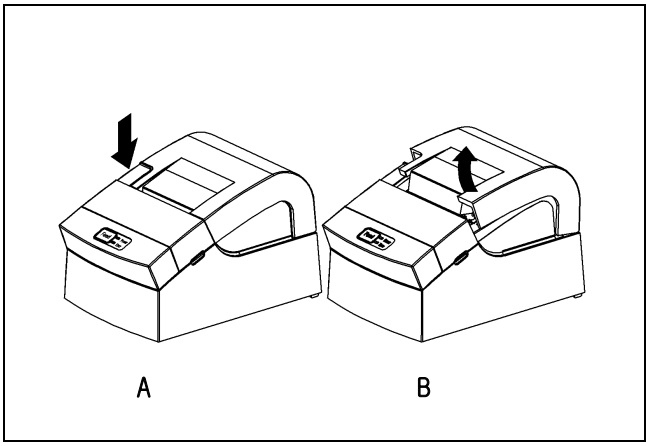


Figure 2-1-5. Cover Open Installation

1. Press push button (A) to release the cover lock.
2. Lift the cover assembly (B) by hand and open the cover.

2-1-6 Paper Roll Installation

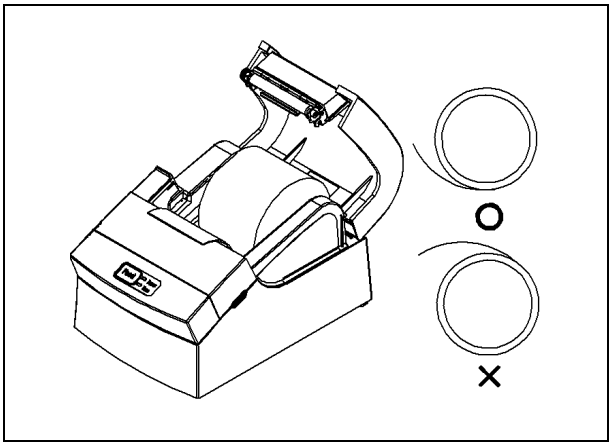


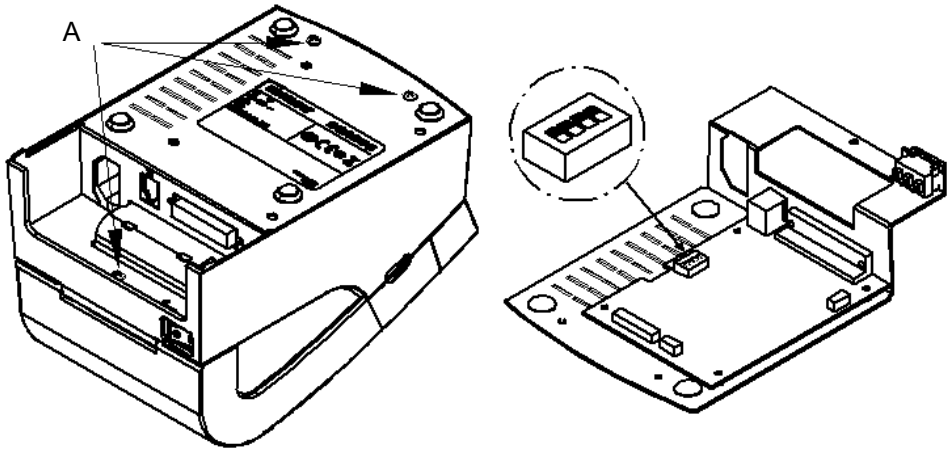
Figure 2-1-6. Paper Roll Installation

1. Open the cover printer and remove the used paper roll core if there is one.
2. Load the paper roll on the paper holder as shown.
3. Close the cover printer.

2-2 Operation

2-2-1 Setting the DIP switches

The DIP switches are located on the bottom of the printer. The DIP switches are used to set the printer to perform various functions. Follow these when changing DIP switches setting :



1. Remove three screws (A) at the bottom of the device.
2. Set the DIP switches in the PCB assembly to the desired configuration.

※ **Note** : Always change DIP switch settings only when the printer is turned off. Change made with the power on have no effect and then on again.

Figure 2-2-1. Setting the DIP switches

2-2-2 Setting the DIP switch (RS-232C Serial Interface)

• DIP Switch

SW	Function	ON	OFF	Default
1-1	Auto Cutter	Disable	Enable	OFF
1-2	Reserved			-
1-3	Baud Rate	Refer to Table 1		OFF
1-4				OFF

• Table 1 – Baud rate (bps) Selection

Transmission Speed	1-3	1-4	Default
9600	OFF	OFF	9600
19200	OFF	ON	
38400	ON	OFF	
115200	ON	ON	

2-2-3 Setting the DIP switch (IEEE1284 Parallel, USB2.0 Interface)

• DIP Switch

SW	Function	ON	OFF	Default
1-1	Auto Cutter	Disable	Enable	OFF
1-2	Reserved			-
1-3				-
1-4				-

2-2-4 Setting the Memory Switches

This printer has “Memory Switch” set which is software switches. Memory Switch set has “MSW1”, “MSW2”, “MSW8”, “MSW9” “Customize value”, “Serial communication condition”.
“Memory Switch setting utility” can change the Memory Switch set to ON or OFF as shown in the table below. (default : all OFF)

※ **NOTE**
- The Memory Switch is available to be changed by three methods.
  - Memory Switch setting utility.
  - Control from ESC/POS command.

Settings of the Memory Switch are stored in the NV memory : therefore, even if the printer is turned off, the settings are maintained.

MSW2

Switch	Function	ON	OFF
1	Reserved	-	Fixed to OFF
2	Auto Cutter Function	Full Cutting	Partial Cutting
3~8	Code Page Selection	Refer to following Table	

MSW2-8	MSW2-7	MSW2-6	MSW2-5	MSW2-4	MSW2-3	Character Table
OFF	OFF	OFF	OFF	OFF	OFF	Page 0 437 (USA,standard Europe)
OFF	OFF	OFF	OFF	ON	OFF	Page 1 Katakana
OFF	OFF	OFF	ON	OFF	OFF	Page 2 850 (Multilingual)
OFF	OFF	OFF	ON	ON	OFF	Page 3 860 (Portuguese)
OFF	OFF	ON	OFF	OFF	OFF	Page 4 863 (Canadian-French)
OFF	OFF	ON	OFF	ON	OFF	Page 5 865 (Nordic)
OFF	OFF	ON	ON	OFF	OFF	Page 16 1252 (Latin I)
OFF	OFF	ON	ON	ON	OFF	Page 17 866 (Cyrillic #2)
OFF	ON	OFF	OFF	OFF	OFF	Page 18 852 (Latin 2)
OFF	ON	OFF	OFF	ON	OFF	Page 19 858 (Euro)
OFF	ON	OFF	ON	OFF	OFF	Page 21 862 (Hebrew DOS code)
OFF	ON	OFF	ON	ON	OFF	Page 22 864 (Arabic)
OFF	ON	ON	OFF	OFF	OFF	Page 23 Thai42
OFF	ON	ON	OFF	ON	OFF	Page 24 1253 (Greek)
OFF	ON	ON	ON	OFF	OFF	Page 25 1254 (Turkish)
OFF	ON	ON	ON	ON	OFF	Page 26 1257 (Baltic)
ON	OFF	OFF	OFF	OFF	OFF	Page 27 Farsi
ON	OFF	OFF	OFF	ON	OFF	Page 28 1251 (Cyrillic)
ON	OFF	OFF	ON	OFF	OFF	Page 29 737 (Greek)
ON	OFF	OFF	ON	ON	OFF	Page 30 775 (Baltic)
ON	OFF	ON	OFF	OFF	OFF	Page 31 Thai14
ON	OFF	ON	OFF	ON	OFF	Page 32 Hebrew Old code
ON	OFF	ON	ON	OFF	OFF	Page 33 1255 (Hebrew Newcode)
ON	OFF	ON	ON	ON	OFF	Page 34 Thai11
ON	ON	OFF	OFF	OFF	OFF	Page 35 Thai18
ON	ON	OFF	OFF	ON	OFF	Page 36 855 (Cyrillic)
ON	ON	OFF	ON	OFF	OFF	Page 37 857 (Turkish)
ON	ON	OFF	ON	ON	OFF	Page 38 928 (Greek)
ON	ON	ON	OFF	OFF	OFF	Page 39 Thai16
ON	ON	ON	OFF	ON	OFF	Reserved
ON	ON	ON	ON	OFF	OFF	Reserved
ON	ON	ON	ON	ON	OFF	Reserved
OFF	OFF	OFF	OFF	OFF	ON	Page 43 (PC852e)
OFF	OFF	OFF	OFF	ON	ON	Page 44 (PC864e)
OFF	OFF	OFF	ON	OFF	ON	Page 45 (PC865/PC1252e)
OFF	OFF	OFF	ON	ON	ON	Reserved
OFF	OFF	ON	OFF	OFF	ON	Page 47 ISO 8859-1(Latin I)

MSW9

Switch	Function	ON	OFF
1	Language Selection	Korean/Chinese	ENG
2~4	Reserved	-	Fixed to OFF
5~8	International Character Set Selection	Refer to following Table	

MSW9-8	MSW9-7	MSW9-6	MSW9-5	International Character Set
OFF	OFF	OFF	OFF	0. USA
OFF	OFF	OFF	ON	1. France
OFF	OFF	ON	OFF	2. Germany
OFF	OFF	ON	ON	3. UK
OFF	ON	OFF	OFF	4. Denmark
OFF	ON	OFF	ON	5. Sweden
OFF	ON	ON	OFF	6. Italy
OFF	ON	ON	ON	7. Spain
ON	OFF	OFF	OFF	8. Japan
ON	OFF	OFF	ON	9. Norway
ON	OFF	ON	OFF	10. Denmark II
ON	OFF	ON	ON	11. Spain II
ON	ON	OFF	OFF	12. Latin America
ON	ON	OFF	ON	13. Korea

MSW10

Switch	Function	ON	OFF
1~2	Reserved	-	Fixed to OFF
3	Print Density	Dark	Normal
4~5	Reserved	-	Fixed to OFF
6~8	Partial Cut Step Selection	Refer to following Table	

MSW10-8	MSW10-7	MSW10-6	Step
OFF	OFF	OFF	85 Steps (Default)
OFF	OFF	ON	82 Steps
OFF	ON	OFF	83 Steps
OFF	ON	ON	84 Steps
ON	OFF	OFF	86 Steps
ON	OFF	ON	87 Steps
ON	ON	OFF	88 Steps
ON	ON	ON	89 Steps

2-2-5 Hexadecimal Dumping

This feature allows experienced users to see exactly what data is coming to the printer. This can be useful in finding software problems. when you turn on the hexadecimal dump function, the printer prints all commands and data in hexadecimal format along with a guide section to help you find specific commands.
To use the hexadecimal dump function, follow these steps :

1. After you make sure that the printer is off.
   Open the cover.
2. Turn on the printer, while holding down the FEED button.
3. close the cover, then the printer enters the hexadecimal dump mode.
4. Run any software program that sends data to the printer. The printer will print all the codes it receives in a two-column format. The first column contains the hexadecimal codes and the second column gives the ASCII characters that corresponds to the codes.

```
0000: 1B 21 00 1B - 26 02 40 40
0008: 02 0D 1B 44 - 0A 14 1E 28
0010: 00 0A 0A 41 - 0D 42 0A 43
```

※ **Note :** A period(.) is printed for each code that no ASCII equivalent.
※ **Note :** During the hex dump all commands expect DLE EOT and DLE ENQ are disabled.

5. When the printing finishes, turn off the printer.
6. Turn on the printer and then the hexadecimal model is off.

2-2-6 The self Test Mode

The self-test checks whether the printer has any problem. If the printer does not function properly, contact your dealer The self-test checks the following :

1. Make sure paper roll ahs been installed properly.
2. Turn on the power while holding down the FEED button. The self-test begins.
3. Tue self-test prints the current printer status, which provides the control ROM version and the DIP witch setting.
4. The self-test automatically ends and cuts the paper after printing the following.

***** COMPLETED *****

The printer is ready to receive data as soon as it completes the self-test.

```
SRP-150 V01.0 CHN 120709
==========================


DIP SWITCH SW1 STATUS
    DIP SW1      1234
         ON :
         OFF :    ****

PRINT DENSITY : NORMAL

AUTO CUTTER : ENABLE

PARALLEL(IEEE1284) INTERFACE
```

ASCII

```
!"#$%&'()*+,-./0123456789:;<=>?@
"#$%&'()*+,-./0123456789:;<=>?@A
#$%&'()*+,-./0123456789:;<=>?@AB
$%&'()*+,-./0123456789:;<=>?@ABC
%&'()*+,-./0123456789:;<=>?@ABCD
&'()*+,-./0123456789:;<=>?@ABCDE
'()*+,-./0123456789:;<=>?@ABCDEF
()*+,-./0123456789:;<=>?@ABCDEFG
)*+,-./0123456789:;<=>?@ABCDEFGH
*+,-./0123456789:;<=>?@ABCDEFGHI
+,-./0123456789:;<=>?@ABCDEFGHIJ
,-./0123456789:;<=>?@ABCDEFGHIJK
-./0123456789:;<=>?@ABCDEFGHIJKL
./0123456789:;<=>?@ABCDEFGHIJKLM
/0123456789:;<=>?@ABCDEFGHIJKLMN
0123456789:;<=>?@ABCDEFGHIJKLMNO
123456789:;<=>?@ABCDEFGHIJKLMNOP
23456789:;<=>?@ABCDEFGHIJKLMNOPQ
3456789:;<=>?@ABCDEFGHIJKLMNOPQR
456789:;<=>?@ABCDEFGHIJKLMNOPQRS
56789:;<=>?@ABCDEFGHIJKLMNOPQRST
6789:;<=>?@ABCDEFGHIJKLMNOPQRSTU
789:;<=>?@ABCDEFGHIJKLMNOPQRSTUV
89:;<=>?@ABCDEFGHIJKLMNOPQRSTUVW
9:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWX
```

(GB2312)

3. Product Specifications

3-1 Appearance

3-1-1 Printer Dimensions (mm)

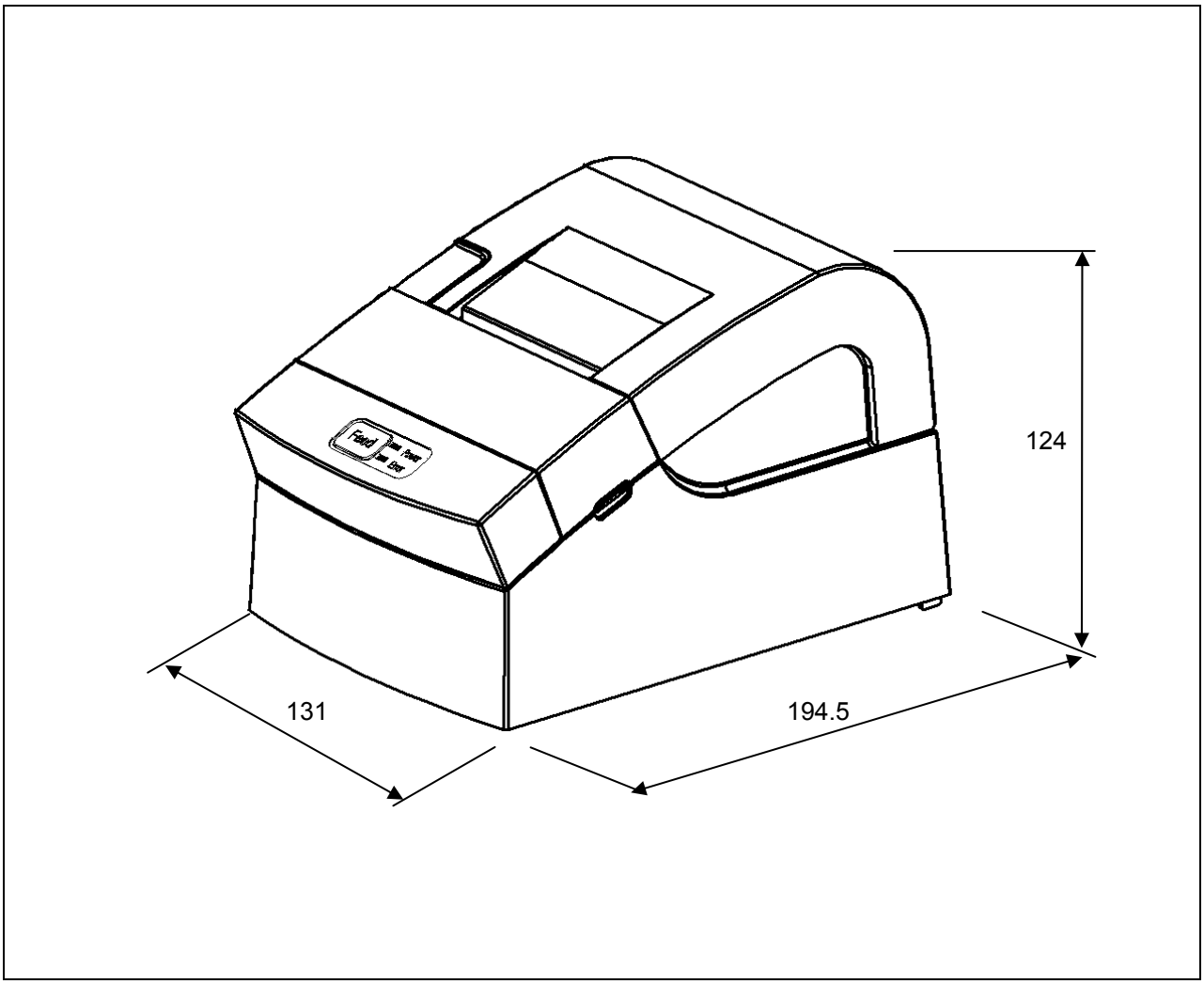
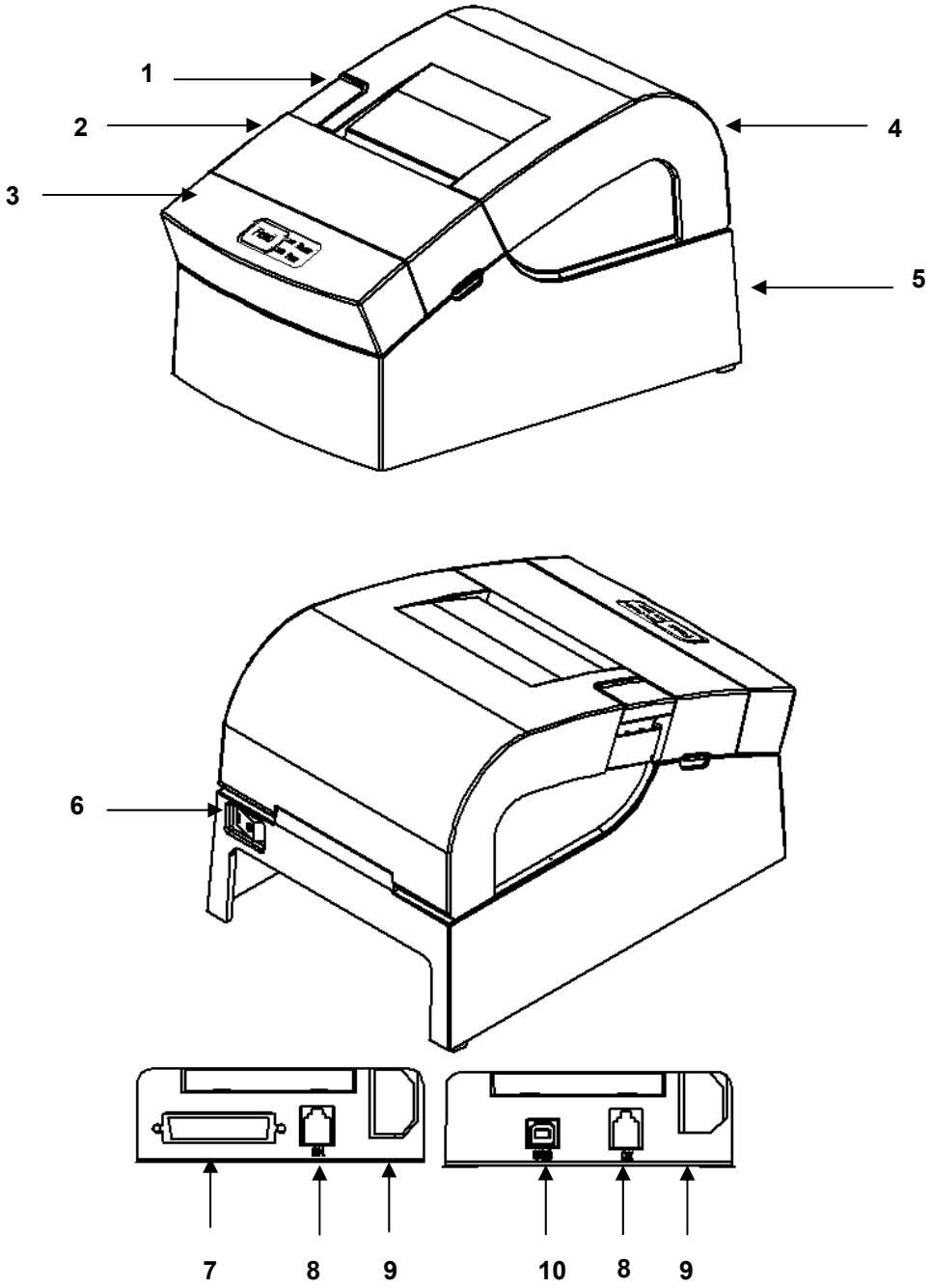


Figure 3-1-1. Printer Dimension

3-1-2 Feature Locations



1. **Push button**
2. **Cover cutter**
3. **Cover function**
4. **Cover paper**
5. **Case main**
6. **Power Button**
7. **Parallel(IEEE1284) / Serial(RS-232C)**
8. **DK(RJ11)**
9. **Power Inlet(AC Power cord)**
10. **USB2.0(B-type)**

Figure 3-1-2. Feature Location

3-2 General Specifications

Item	Description	Remark
Product	• SRP-150 : Serial Communication (RS-232C) • SRP-150P : Parallel Communication (IEEE1284) • SRP-150U : USB2.0 Communication	
Processor	• V850ES/JG3-L	
Memory	• M29W160EB(16Mbits)	
Interface Serial (RS-232C)	• Flow Control : DTR / DSR (H/W Flow Control) • Baud Rate :9600~115200 bps • Receive Buffer : 4KBytes • Connector: DSUB-9P female connector (I/F PBA side)	The Baud Rate is determined by DIP S/W position.
Interface Parallel	• Mode : 1) Forward Mode : Compatibility Mode 2) Reverse Mode : Nibble Mode • Connector: DSUB-25 type	
USB	• Transfer Type : BULK • Speed : 12 Mbps (Full-Speed) • Power : Self-Powered	
Printer	• Printing Method : Thermal Line Printing • Printing Speed Mono 70mm/Sec, 18.6 Line/Sec	
Auto Cutter	• Type : Guillotine • Cutting Method : 1 Point Partial Cutting	
Power Consumption	• Approximately 36 W (maximum)	
SMPS	• Input : AC 100V ~ 240V, 50Hz/60Hz • Output : DC 12V±5%, 3A	
Environment Condition	• Input : AC 100V ~ 240V, 50Hz ~ 60Hz • Output : DC12V±5%,3A	
Weight	• 1.1 Kg (With Packing)	
Dimensions(mm)	• 131(W) x 194.5(D) x 124(H)	

Table 3-2. General Specification

3-3 Thermal Printer Specifications

3-3-1 Printer Specification

Item	Description	Remark
Model	• SRP-150	
Print Method	• Thermal Line Printing	
Dot Density	• 0.125mm(8 Dots/mm)	
Printing Direction	• Unidirection with friction feed	
Printing Width	• 48mm, 384 dots Position	
Character / Line	• 32CPL(Font A)	
Character Spacing	• 0.25mm (0.01) (2 dots) (Font A)	
Printing Speed	• Max. 70mm (18.6 Lines / Sec, 2.75inch feed)	
Paper feeding Speed	• Approx. 60mm /Sec	

Table 3-3-1. Thermal Printer Specification

3-3-2 Character Specification

Item	Description	Remark
Number of Character	• Alphanumeric Characters : 95	
Character Structure	• 12 x 24 (Font A) (Including 2-dot spacing in horizontal) • 24 X24 (GB2312)	

Table 3-3-2. Thermal Printer Character Specification

3-3-3 Paper Specification

Item	Description	Remark
Paper Type	• Mono :TF50KS-E(Nippon paper)	
Paper Form	• Paper Roll	
Paper Width	• 58mm(+0,-1)	
Paper Roll Size	• Max 80mm(3.14”)	

Table 3-3-3. Thermal Printer Paper Specification

※ Note

* Mono : The Following paper can be used instead of the specified paper above.
TF50KS-E(Paper thickness : 65μm) : Nippon Paper industries Co., Ltd.
PD 160R (“ : 75μm) : New Oji Paper Mfg, Co., Ltd.
P350 (“ : 62μm) : Kansaki Specialty Paper, Inc. (USA)

3-3-4 Reliability and Environment Specification

Item	Description	Remark
Life	• Mechanism : Monochrome : 20,000,000 Lines The reliability values above are assumed When a 15-Line feed and a 10-Line print repeat alternately • Head : $1x10^8$ Pulses, Monochrome : 50Km • Auto Cutter : 1,000,000 Cut	
Environmental Temperature	• Operating : 0°C ~ +45°C • Storage : -10°C ~ +50°C (Except for Paper)	
Humidity	• 10% ~ 90% RH	

Table 3-3-4. Thermal Printer Reliability Specification

3-3-5 Printable Area

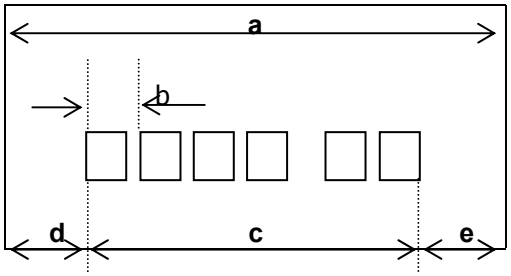


Figure 3-3-5. Printable Area

Item	Description	Remark
a	58+0,-1mm(2.28” ±0.039)	
b	1.5 (0.059”)	
c	48±0.2mm(1.889” ±0.0078)	
d	4.5±0.8mm(0.177” ±0.0314)	
e	4.5±0.8mm	
Dots	384	
Font 12X24	42 Character	

3-3-6 TPH (Thermal Printer Head) Specification

Item	Description	Remark
Model	SAJ048-8A442(AOI Electronics)	
Heat Element Structure	2 Heaters / Dot	
Number of Heat Element	384 Dots	
Heat Element Pitch	0.125mm/dot, 8Dot/mm	
Print Width	48±0.2mm	
Average Resistance	176Ω ± 4%	
Thermister	1) Resistance R25 : 30kΩ ± 5% (At 25℃) 2) B Value : 3950K ± 2% 3) Temperature : - 40℃ ~ +125℃	

Item	Maximum	Unit	Conditions
Print Cycle (S.L.T.)	1.25	ml/Line	Tsub=25℃
Supply Energy	0.20	mJ/Dot	
Supply Voltage	8.5V	V	
Substrate Temperature	65	℃	Thermistor Temperature
Number of heating dots at same time	384	Dots	
Logic Supply Voltage (Vdd)	2.75~5.25	V	Include Peak Voltage of Vdd
Logic input Voltage (Vin)	-0.5 ~ Vdd+0.5	V	

Table 3-3-6. TPH Maximum Condition (At 25℃)

3-3-7 Other Component Specification

Item	Description	Remark
Auto Cutter	• Model : 25BY46S-122(CHANGZHOU LEILI MOTOR) •Type : Guillotine Type • Motor : Step Motor • Voltage : 7.8±10% VDC • Resistance : 30 Ω(Phase±10%) • Inductance : 4.5±25% mH	
Paper Feed Motor	• Model : 15BY45-87(CHANGZHOU LEILI MOTOR) • Type : 2-Phase, Bi-Polar • Voltage : **7.8**V ± 10% VDC • Resistance : 10 Ω(Phase±7%) • Inductance : 3mH	
Paper End Sensor	• Reflection Type Photo Sensor	

3-4 SMPS Specifications

3-4-1 SMPS (Switching Mode Power Supply) Specification

Item	Description	Remark
Input Voltage	**AC 100~240V, 50~60Hz**	
Input Current	**1.5A**	
In rush Current	**5A**	
Line Regulation	**12V**	
Load Regulation	**12V**	
Ripple Noise	**Below 100mA**	
O.C.P (Over Current Protect)	**5.5A**	
S.C.P (Shot Current Protect)	**Built-in**	

Table 3-4-1 Power Adapter (SMPS) Specification

3-4-2 SMPS Output Connector

Pin Number	Signal Name
1	+12 VDC
2	GND

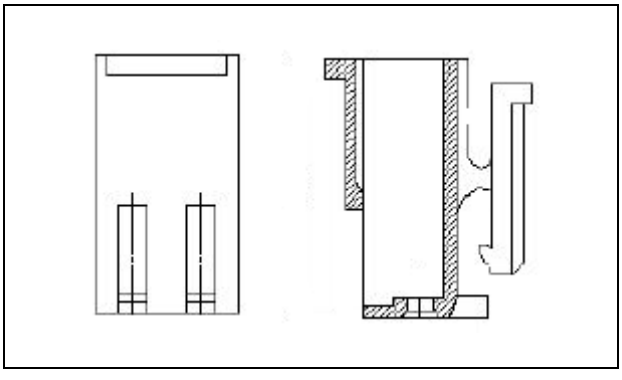


Figure 3-4-2 Power Connector

3-5 Interface Specifications

3-5-1 RS-232C Serial Interface

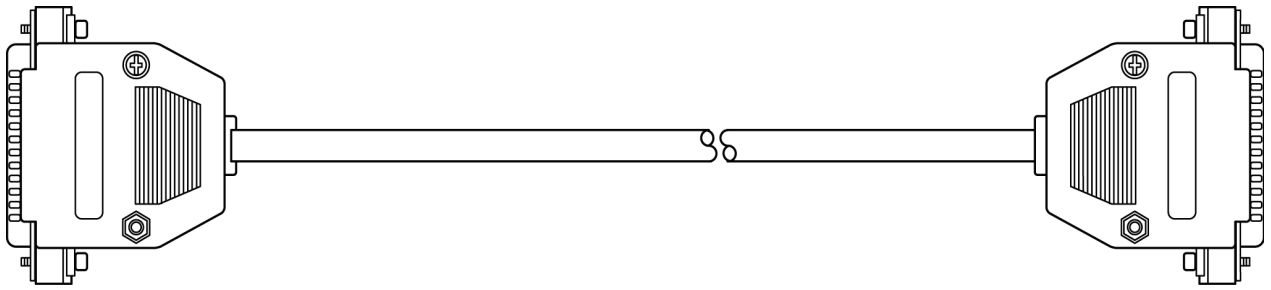
3-5-1(a) Specification

Item	Description	Remark
Data Transmission	• Serial	
Synchronization	• Asynchronous	
HandShaking (Flow Control)	• H/W : DTR/DSR	
Signal Level	• Logic1 (MARK) : -3V ~ -15V • Logic0 (SPACE) : +3V ~ +15V	
Baud Rate	• 9600/19200/38400/115200 Bps	
Data Word Length	• 8 bit	
Parity	• None	
Stop Bit	• 1	
Connector	• DB25P Female (I/F PBA)	

Table 3-5-1(a) RS-232C Specification

※ **Note :** The HandShaking (Flow Control) / Data Word Length / Baud Rate / Parity functions depend on the DIP Switch settings. Refer to the Operation Manual.

3-5-1(b) RS-232C I/F Cable



Printer Side
D-SUB9P-Male

CONN : User Spec
D-SUB9P-Female

Figure 3-5-1(b) RS-232C Cable

3-5-1(c) Cable Connection

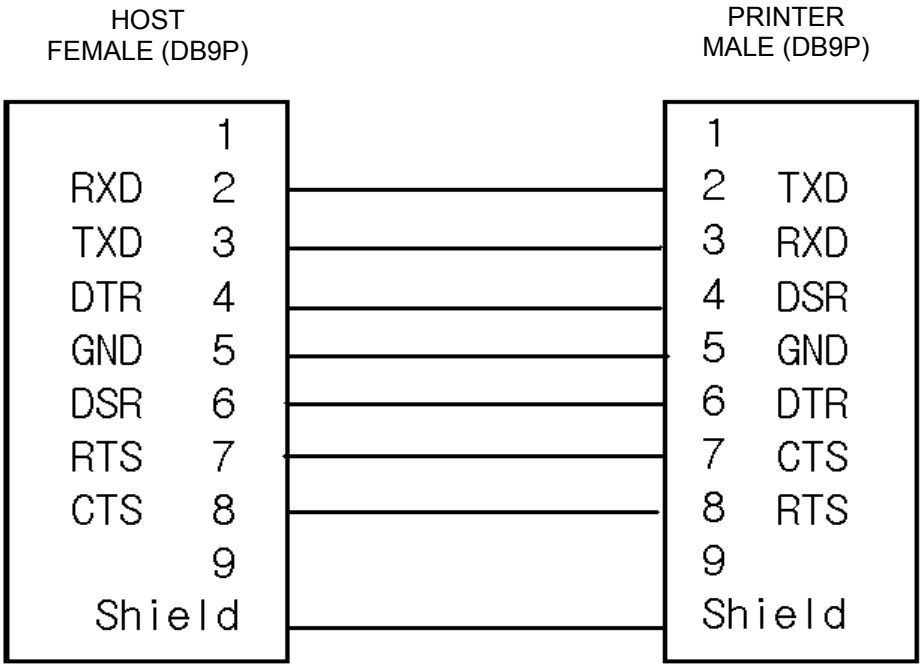


Figure 3-5-1(c) RS-232C Cable Connection

3-5-1(d) Signal Description

Pin No.	Signal name	Direction	Function
1	FG	-	Frame Ground
2	TXD	Output	Transmit Data
3	RXD	Input	Receive Data
4	DSR	Input	This signal indicates whether the host computer can receive data. (H/W flow control) 1) MARK(Logic1) : The host can receive a data. 2) SPACE(Logic0) : The host can not receive a data. 3) The printer transmits a data to the host, after confirming this signal. 4) When XON/XOFF flow control is selected, the printer does not check this signal.
5	GND	Ground	Ground
6	DTR	Output	This signal indicates whether the printer is busy. (H/W flow control) 1) MARK(Logic1) : The printer is busy. 2) SPACE(Logic0) : The printer is not busy. 3) The host transmits a data to the printer, after confirming this signal.
7	CTS	Input	Clear To Send
8	RTS	Output	Ready To Send
9	CTS	-	Clear To Send

Table 3-5-1(d) RS-232C Pin Description

3-5-1(e) H/W Flow Control

When DTR/DSR flow control is select, before transmitting a data, the Printer checks whether the host is BUSY or not. If the host is BUSY, the Printer does not transmit a data to the host. If the host is not BUSY, the Printer transmits a data to the Host. The host is the same. Refer to the Interface Part of Chapter 7 (Special Circuit Diagrams).

3-5-1(f) S/W Flow Control

When XON/XOFF flow control is selected, the printer transmits XON(ACSII 11h) or XOFF(ASCII 13h) signal through the TXD line.
If the Printer is BUSY, the Printer transmits XOFF(ASCII 13h) to host through the TXD line. Then the host recognize that the Printer is BUSY. So, the host does not transmit a data to the Printer. If the Printer is released from BUSY, the Printer transmits XON(ASCII 11h) to host through the TXD line. Then the host recognize that the Printer is not BUSY. And the host transmit a data to the Printer.

※ **Note :** Refer to the Operation Manual about XON/XOFF flow control.

3-5-2 IEEE1284 Parallel Interface

Bidirectional parallel interface : in accordance with the IEEE1284 Nibble/Byte mode.

3-5-2(a) Forward Mode Specification (Compatibility mode)

Data transmission from host computer to printer : Centronics compatible

Item	Description	Remark
Data Transmission	• 8-bit Parallel	
Synchronization	• External supplied nStrobe signals	
HandShaking	• nACK and Busy signals	
Signal Level	• TTL	
Connector	• DSUB 25P	

Table 3-5-2(a) IEEE1284 Specification

3-5-2(b) Reverse Mode Specification (Nibble / Byte mode)

Data transmission from the printer to the host computer.
The STATUS data transmission from the printer to the host computer is accomplished in the Nibble or Byte mode. This mode allows data transmission from the asynchronous printer under the control of the host computer. Data transmission in the Nibble mode are made via the existing control lines in units of for bits (Nibble). In the Byte mode, data transmission in accomplished by making the 8-bit data lines bidirectional. Neither mode can operate at the same time as the compatibility mode, so switching is always required.

3-5-2(c) Signal Specification (Compatibility/Nibble/Byte mode)

Pin No.	Source	Compatibility Mode	Nibble Mode	Byte Mode
1	Host	nStrobe	HostClk	HostClk
2	Host / Printer	Data 0 (LSB)	Data 0 (LSB)	Data 0 (LSB)
3	Host / Printer	Data 1	Data 1	Data 1
4	Host / Printer	Data 2	Data 2	Data 2
5	Host / Printer	Data 3	Data 3	Data 3
6	Host / Printer	Data 4	Data 4	Data 4
7	Host / Printer	Data 5	Data 5	Data 5
8	Host / Printer	Data 6	Data 6	Data 6
9	Host / Printer	Data 7 (MSB)	Data 7 (MSB)	Data 7 (MSB)
10	Printer	nAck	PtrClk	PtrClk
11	Printer	Busy	PtrBusy	PtrBusy
12	Printer	Perror	AckDataReq	AckDataReq
13	Printer	Select	Xflag	Xflag
14	Host	nAutoFeed	HostBusy	HostBusy
15	Printer	nFault	ND	ND
16	Host	nInit	nInit	nInit
17	Host	nSelsctIn	IEEE 1284 Active	IEEE 1284 Active
18~25	GND	GND	GND	GND

Table 3-5-2(c) IEEE1284 Pin Description

3-5-2(d) IEEE1284 I/F Cable

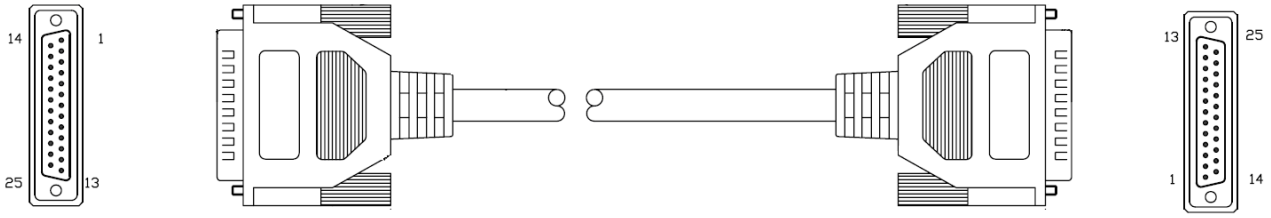


Figure 3-5-2(d) IEEE1284 Cable

3-5-3 USB2.0 Interface

USB (Universal Serial Bus) Serial Communication.

3-5-3(a) Specification

Item	Description	Remark
Transfer Type	• BULK	
Data Signal	• Bi-direction, Half-Duplex • D+/D-	
Data Format	• NRZI Format • Zero Bit Stuffing after 6 ones	
Transceiver	• Differential Receive Sensitivity : 200[mV] • Differential common Mode Range : 0.8 ~ 2.5[V] • Single-End Receiver Threshold : 0.8 ~ 2.0[V]	
Speed	• 12 Mbps	
Cable & Connector	• Cable : 5m / 2m • Connector : B Type	
Other	• Support USB SPEC V1.1	

Table 3-5-3(a) USB Specification

3-5-3(b) Signal Description

Pin No.	Signal Name	Assignment(Color)	Function
Shell	Shield	Drain Wire	Frame Ground
1	VBUS	Red	Host Power : DC5[V] / 500[mA]
2	D-	White	**Data line**
3	D+	Green	**Data line**
4	GND	Black	Signal Ground

Table 3-5-3(b) USB Pin Description

3-5-3(c) Cable

USB cable consists of four conductors, two power conductors, and two signal conductors.
High-/full-speed cable consists of a signaling twisted pair, VBUS, GND, and an overall shield. High-/full speed cable must be marked to indicate suitability for USB usage. High-/full-speed cable may be used with either low-speed, full-speed, or high-speed devices. When high-/full-speed cable used with low-speed devices, the cable must meet all low-speed requirements.
Low-speed recommends, but does not require the use of a cable with twisted signaling conductors.

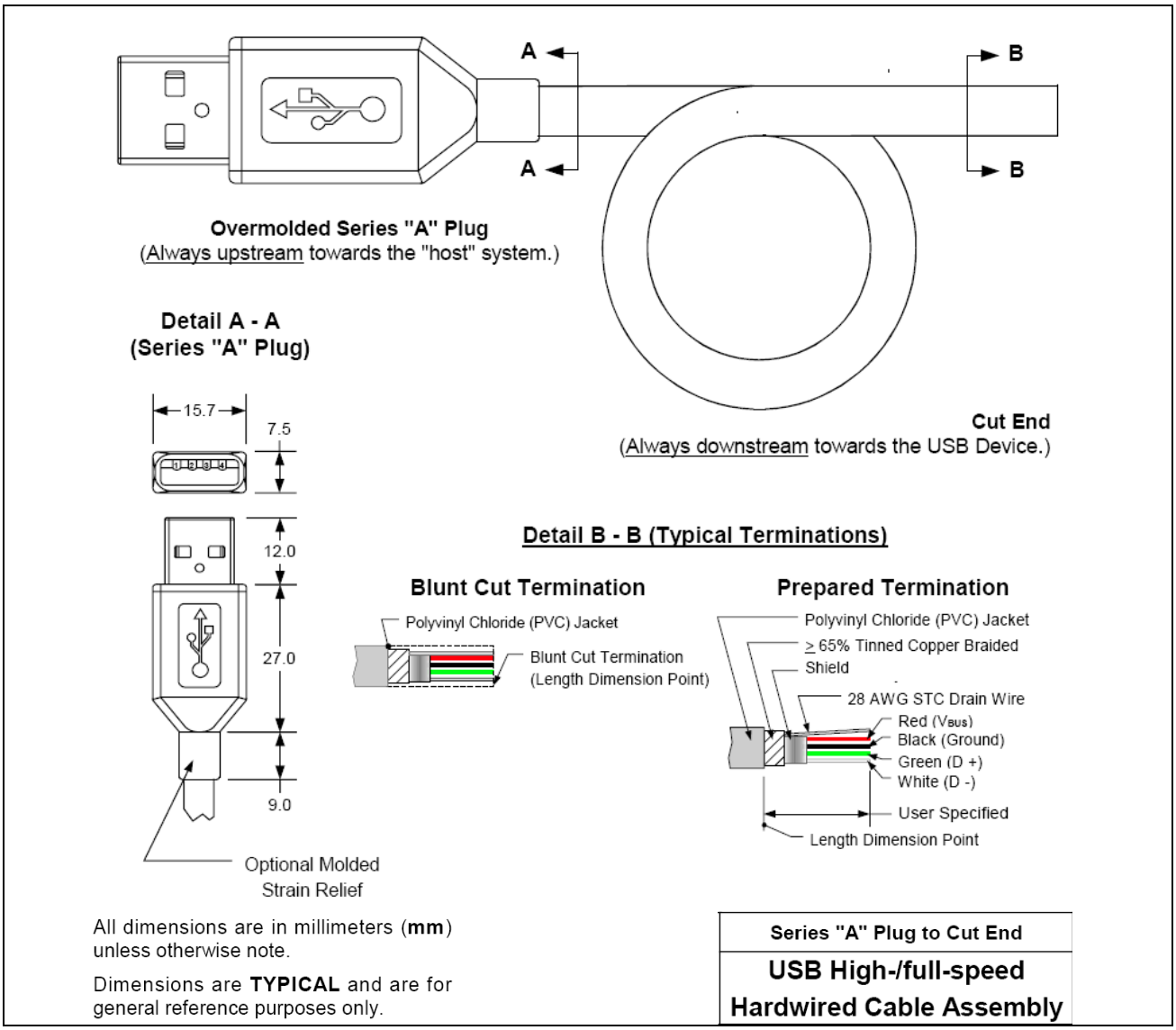


Figure 35-3(c) USB Cable

3-5-4(d) Construction

Raw materials used in the fabrication of this cable must be of such quality that the fabricated cable is capable of meeting or exceeding the mechanical and electrical performance criteria of the most current USB Specification revision and all applicable domestic and international safety/testing agency requirements; e.g., UL, CSA, BSA, NEC, etc., for electronic signaling and power distribution cables in its category.

American Wire Gauge (AWG)	Nominal Conductor Outer Diameter	Stranded Tinned Conductors
28	0.381 mm (0.015) 0.406 mm (0.016)	7 x 36 19 x 40
26	0.483 mm (0.019) 0.508 mm (0.020)	7 x 34 19 x 38
24	0.610 mm (0.024) 0.610 mm (0.024)	7 x 32 19 x 36
22	0.762 mm (0.030) 0.787 mm (0.031)	7 x 30 19 x 34
20	0.890 mm (0.035) 0.931 mm (0.037)	7 x 28 19 x 32

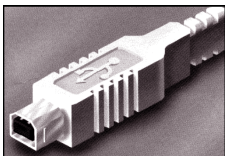
Table 3-5-4(d) Power Pair

※ **Note:** Minimum conductor construction must be stranded tinned copper.

To minimize end user termination problems, USB uses a keyed connector protocol. The physical difference in the Series A and B connectors insures proper end user connectivity. The A connector is the principle means of connecting USB devices directly to a host or to the downstream port of a hub. All USB devices must have the standard Series A connector specified in this chapter. The B connector allows device vendors to provide a standard detachable cable. This facilitates end user cable replacement.
Figure 2-10 illustrates the keyed connector protocol.

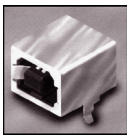
Series B Connectors

◆Series B plugs are always oriented downstream towards the *U*SB *Device*



B Plugs (*From the Host System*)

B Receptacles (*Upstream Input to the USB Device or Hub*)

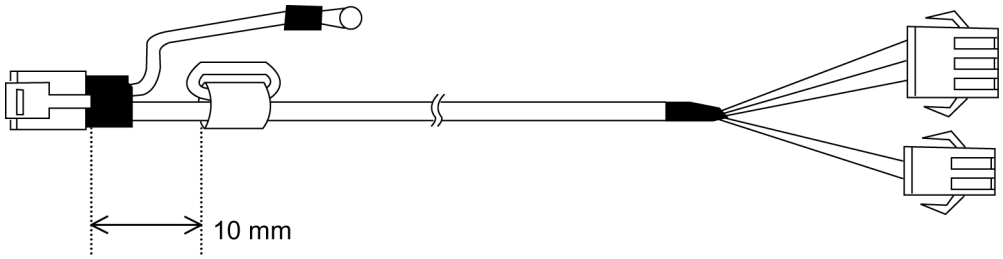


The following list explains how the plugs and receptacles can be mated:

- Series “A” receptacle mates with a Series “A” plug. Electrically, Series “A” receptacles function as outputs from host systems and/or hubs.
- Series “A” plug mates with a Series “A” receptacle. The Series “A” plug always is oriented towards the host system.
- Series “B” receptacle mates with a Series “B” plug (male). Electrically, Series “B” receptacles function as inputs to hubs or devices.
- Series “B” plug mates with a Series “B” receptacle. The Series “B” plug is always oriented towards the USB hub or device.

3-6 Cash Drawer Specifications

3-6-1 Drawer Cable



Ferrite Core : 1 turn (OP-18E : 18.2 x 12.5 x 25.5)

Figure 3-6-1 Drawer Cable

3-6-2 Cable Connection

Pin No.	Description	Direction
1	Frame GND	-
2	Drawer Kick-Out Driver Signal #1	Output
3	Drawer Open / Close Signal	Input
4	+12V	-
5	Drawer Kick-Out Driver Signal #2	Output
6	Signal GND	-

Table 3-6-2 Drawer Cable Connection

※ **Note :** +12V is always output through pin 4 during power on.

4. Hardware

4-1 Wiring Diagram

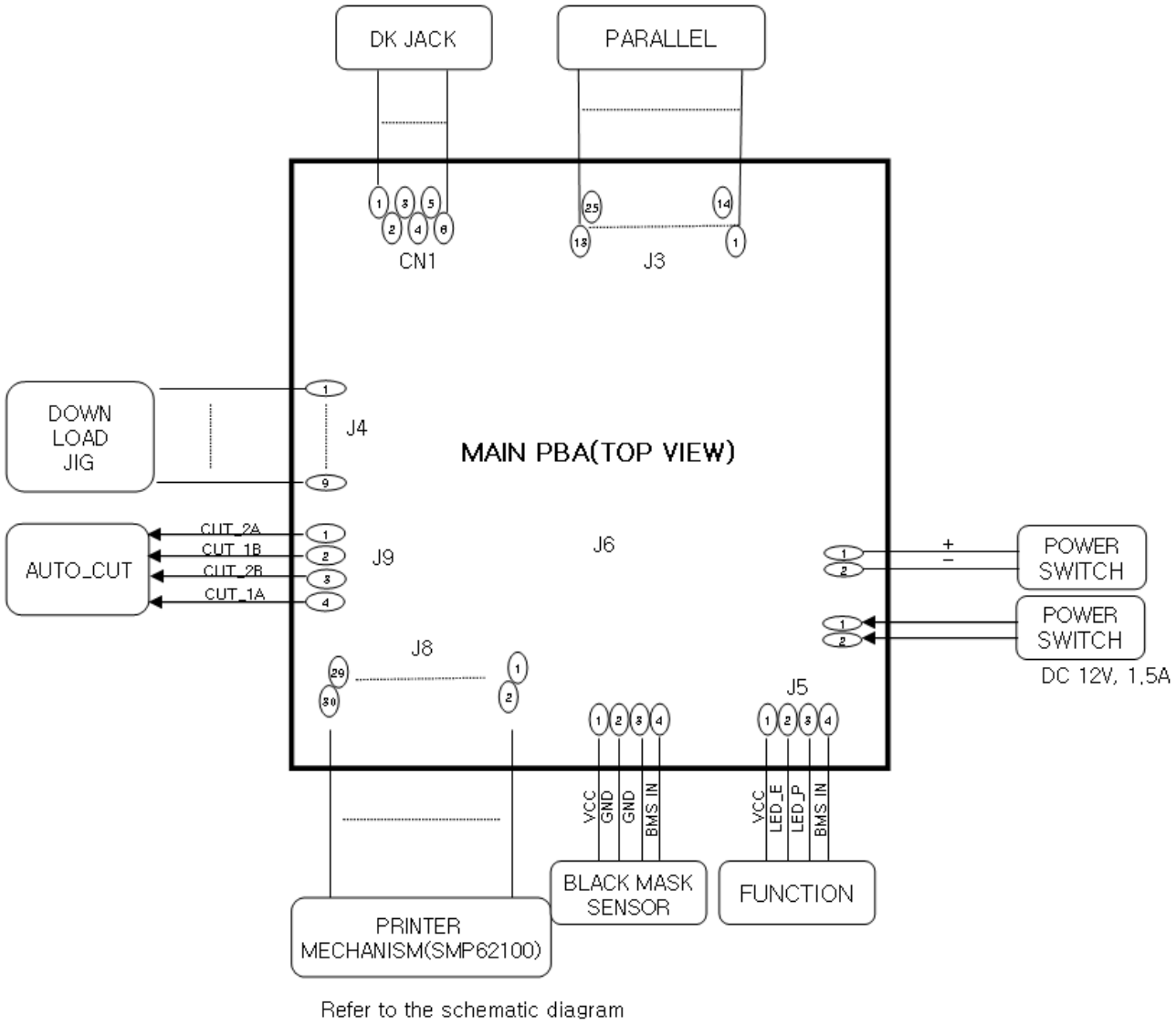


Figure 4-1-1 ARP-105P Board Wiring Diagram

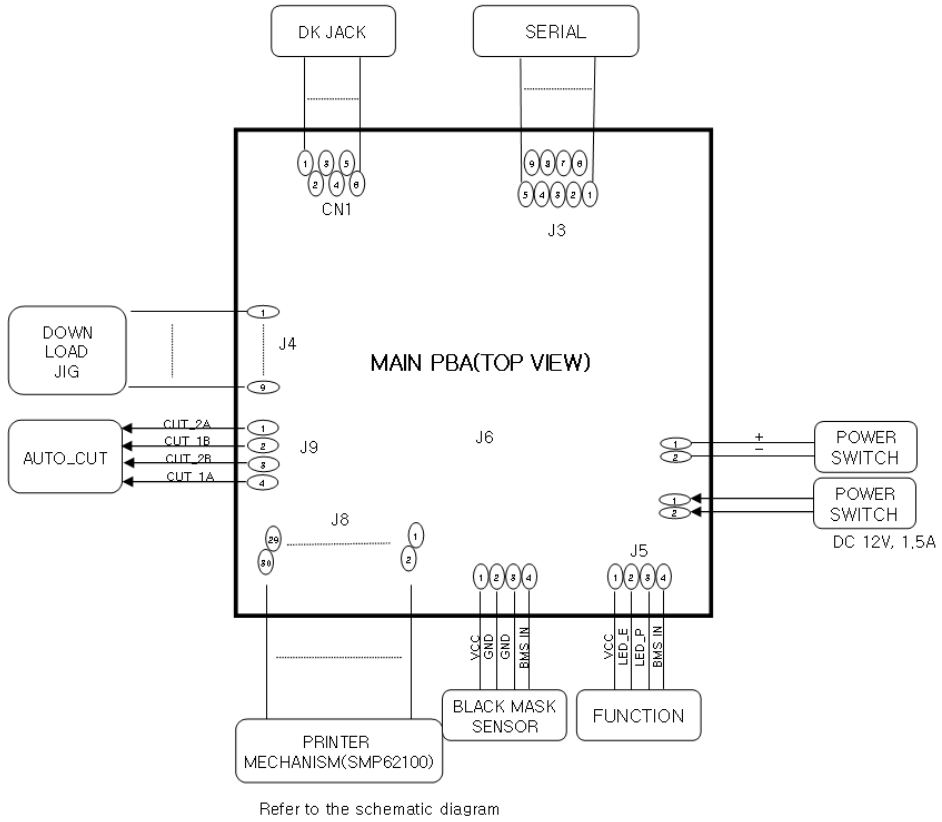


Figure 4-1-2 SRP-150S Board Wiring Diagram

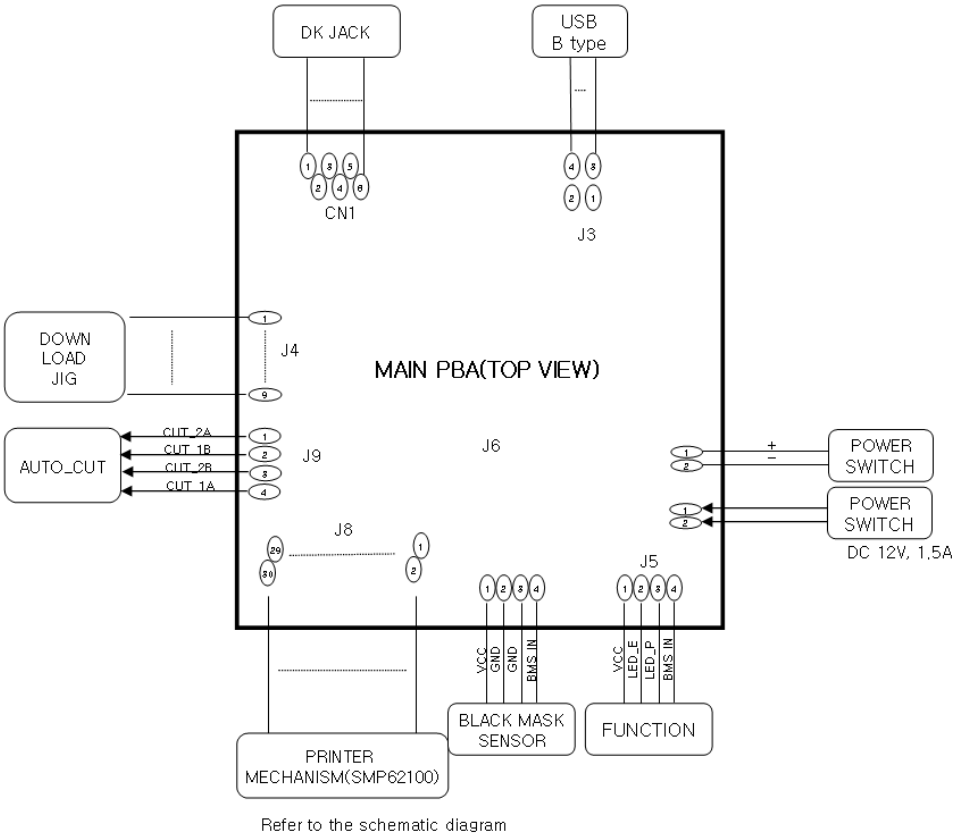


Figure 4-1-3 SRP-150U Board Wiring Diagram

4-2 Block Diagram

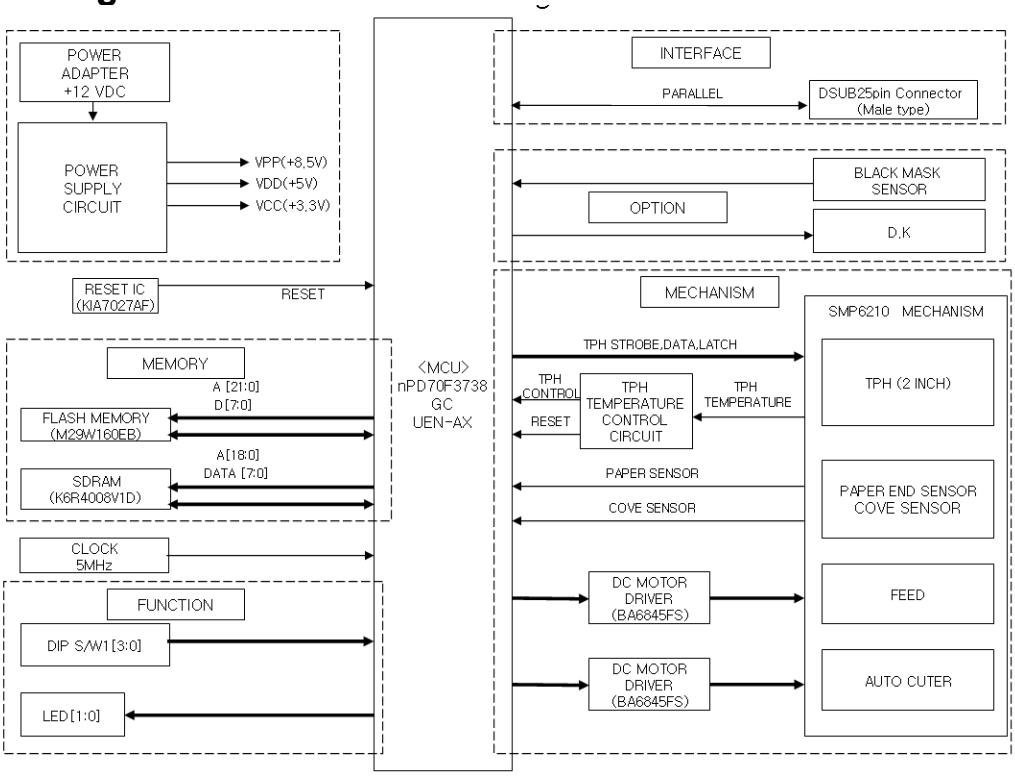


Figure 4-2-1 SRP-150P Block Diagram

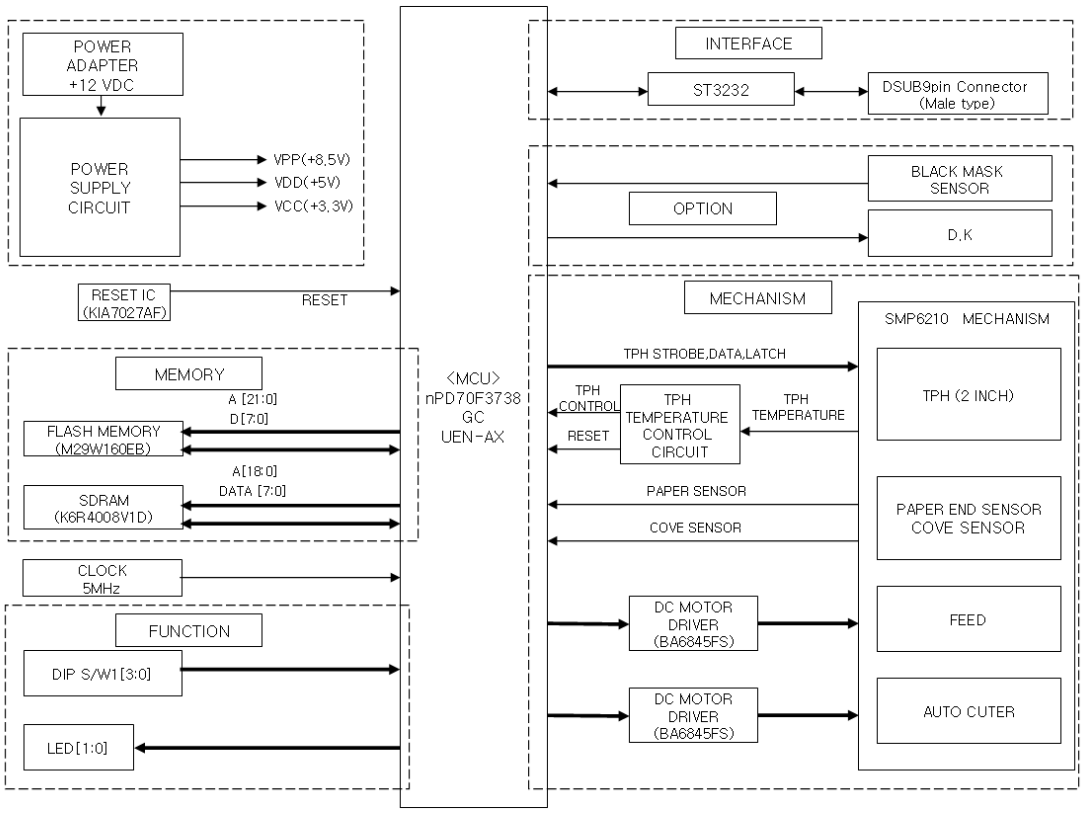


Figure 4-2-2 SRP-150S Block Diagram

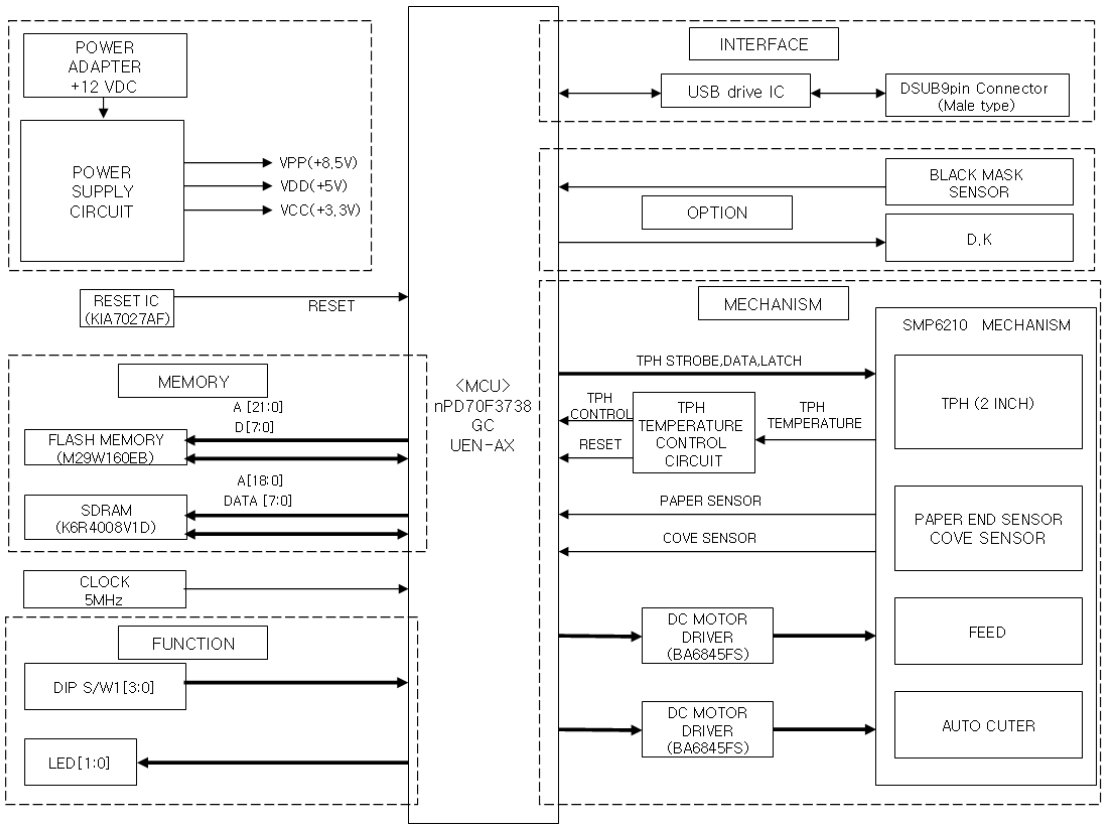


Figure 4-2-3 SRP-150U Block Diagram

4-3 Special Circuit Descriptions

4-3-1 Power Circuit

This system is operated under 100Vac or 240Vac. The power circuit supplies the three differential DC voltage sources.

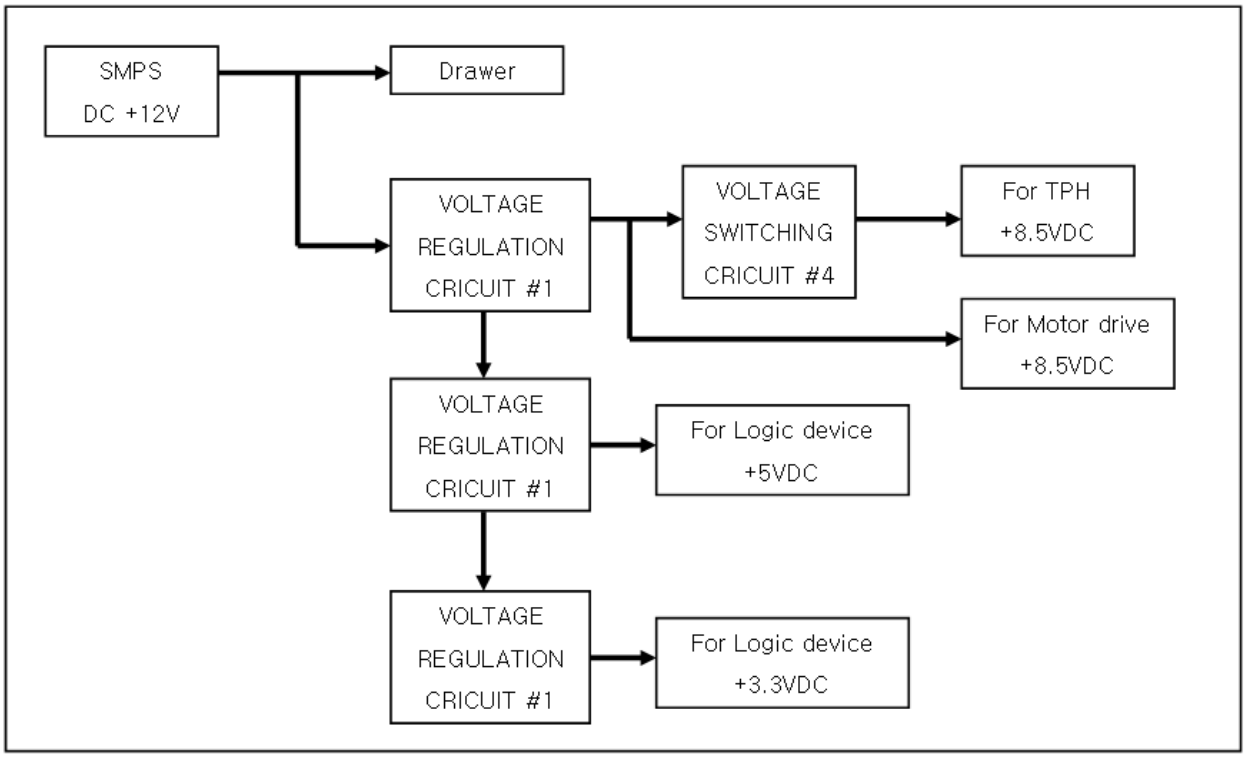


Figure 4-3-1 Power Block Diagram

No.	VOLTAGE	DESCRIPTION
1	VPP(+12VDC)	Cash Drawer Solenoid Driving
2	VTH(+8.5VDC)	Thermal Printer Head (TPH) Voltage / Step Motor Voltage
3	Vcc(5 VDC)	Logic
4	Vdd(+3.3VDC)	CPU, Flesh, SRAM, Reset Voltage, Sensor Voltage

No1. Drawer Driving: +12VDC
+12VDC is supplied from SMPS. This Voltage is smoothed by capacitors.
This voltage is used as a Cash Drawer Solenoid Driving voltage.

No2. Voltage : +8.5V (Thermal Printer Head Voltage / Step Motor Voltage **)**
Change the input 12V to 8.5V by a regulation. (LM2575S-ADJ)

No3. Logic IC Driving Voltage: +5V
Change the input 8.5V to 5V by a regulation. U30(BA17805FP_E2).

No4. Logic IC Driving Voltage : +3.3V (CPU, Flesh, SRAM, Reset Voltage)
Change the input 5V to 3.3V by a regulation. U31(BA033).

4-3-2 RESET Circuit

Reset signal is signal in order to start-up CPU under Power-on.
Reset circuit uses a reset KIA7027. When 3.3Vdc is fallen under 2.7Vdc by Power-off, reset signal prohibits the system from miss-operating by lowering down to 0V.

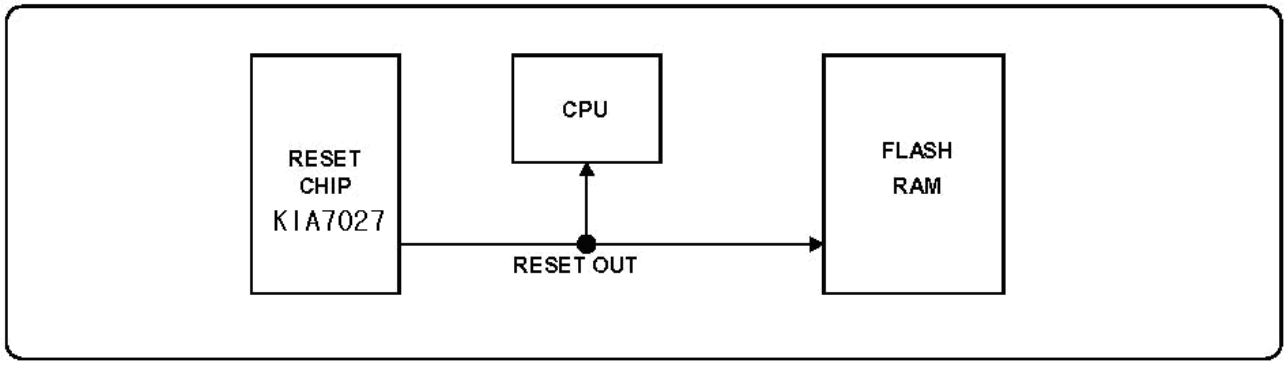


Figure 4-3-2-1 Reset Block Diagram

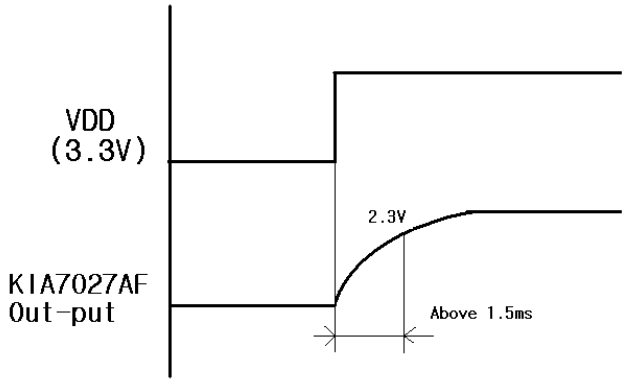


Figure 4-3-2-2 Reset Waveform

4-3-3 Cash Drawer Circuits

1) Cash Drawer Driving Circuit

The circuit is used for opening cash drawer and driven by the 2SD2170. When its state is high level signal, 2SD2170 drive the solenoid to open the cash drawer. As an optional item, we provide sensor switch (we call it a compulsory switch) which checks the drawer whether it is opened or not. This sensor switch turns on for the drawer open condition, and turns off for the other.

※ **Caution :** Make sure that the Cash Drawer solenoid resistance is more than 20Ω.

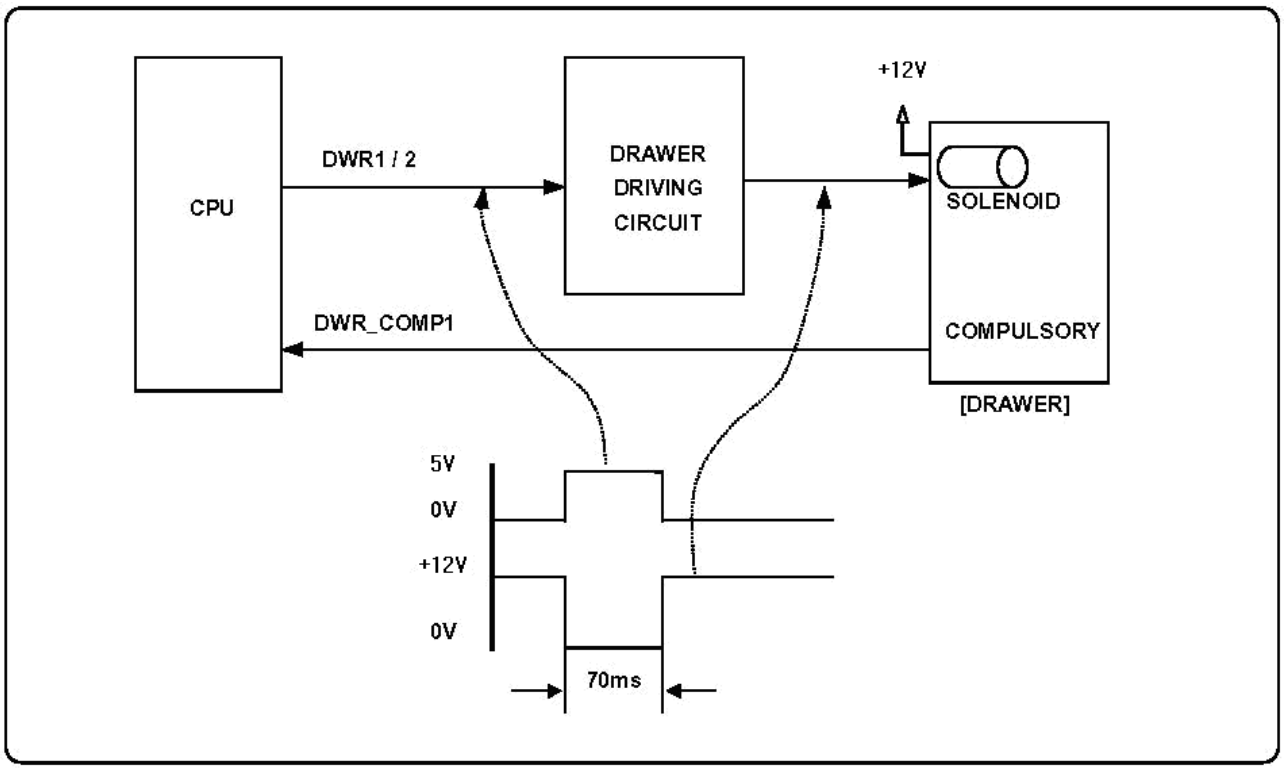


Figure 4-3-3 Cash Drawer Block Diagram

4-3-4 RS-232C Communication Block Diagram

The CPU is used for serial communication. And also RS-232C Driver (MAX232), is used to serial communication. Show following block diagram.

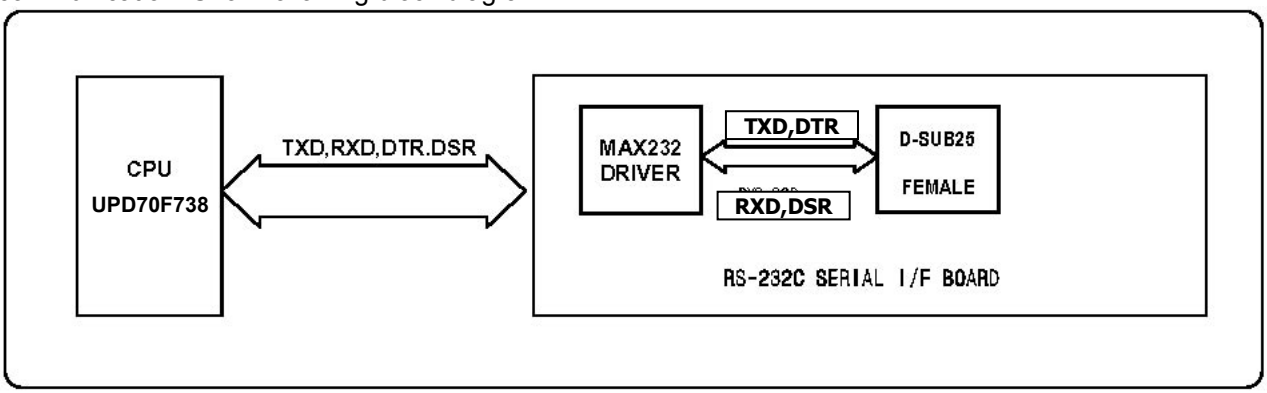


Figure 4-3-4-1 RS-232C Communication Block Diagram

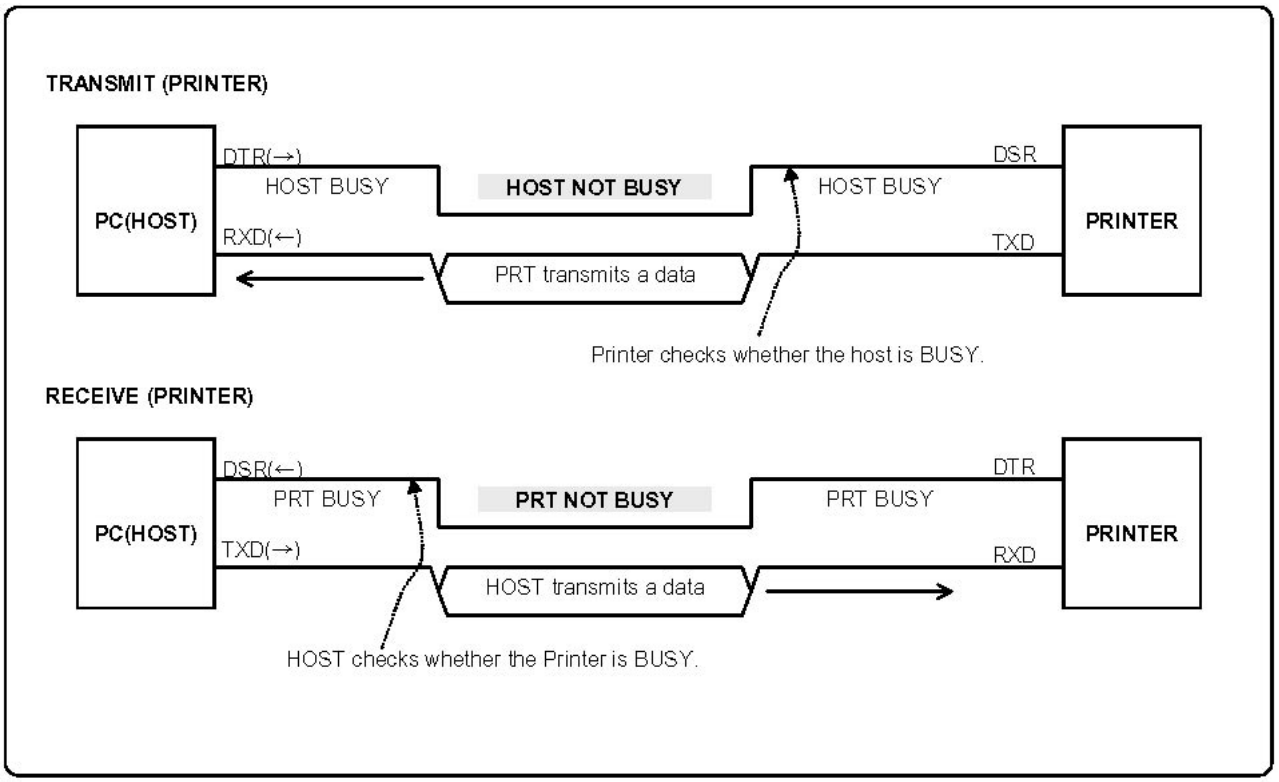


Figure 4-3-4-2 RS-232C Communication Waveform

4-3-5 Parallel Communication Block Diagram

The printer support the bidirectional Parallel Interface with Centronics, Nibble, Byte Mode.
The Centronics is Forward and the Nibble, Byte are reverse Mode.

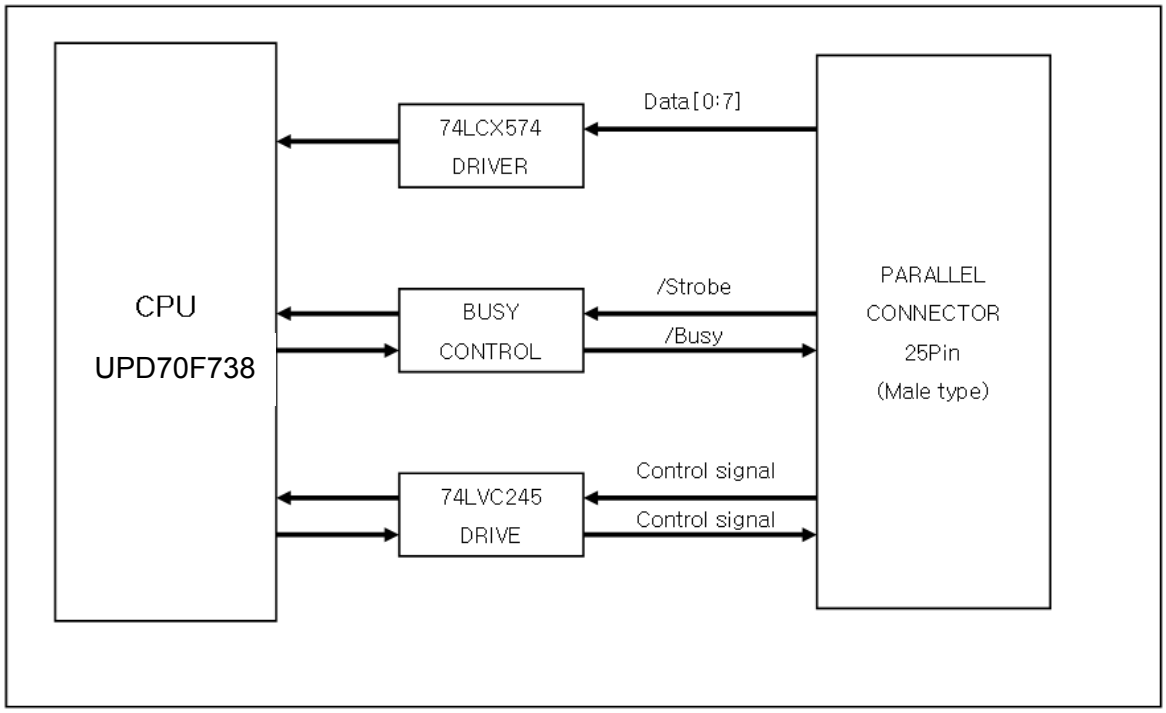


Figure 4-3-5 IEEE1284 Communication Block Diagram

4-3-6 USB2.0 Communication Block Diagram

The printer support the USB (Universal Serial Bus). The transfer type of the printer is the BULK.

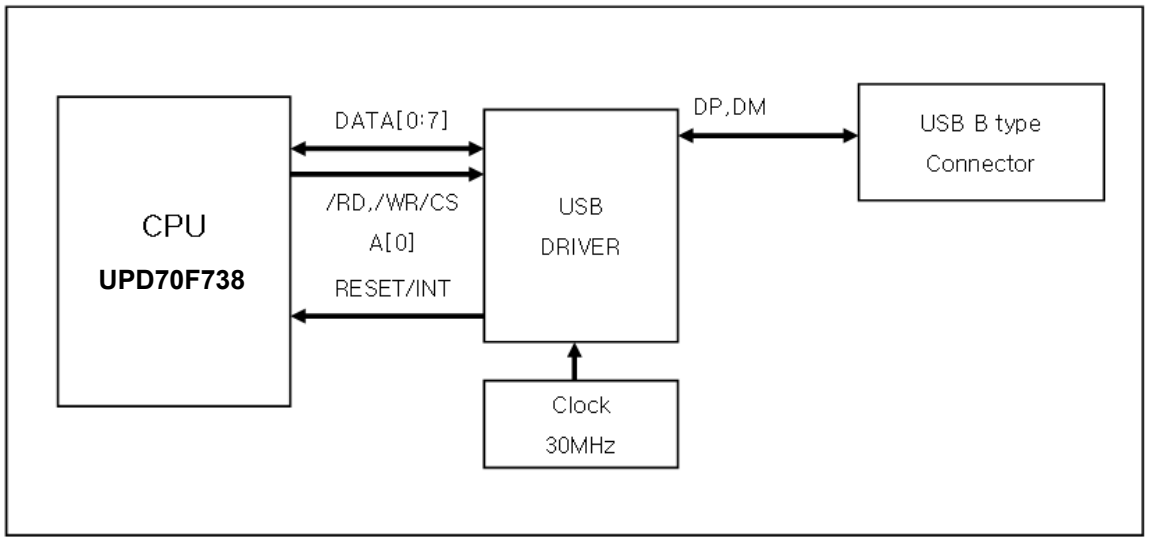


Figure 4-3-6 USB2.0 Communication Block Diagram

4-3-7 DIP Switch Circuit

The key board circuits consist of 4 lines. The CPU reads the DIP S/W only once at power on.

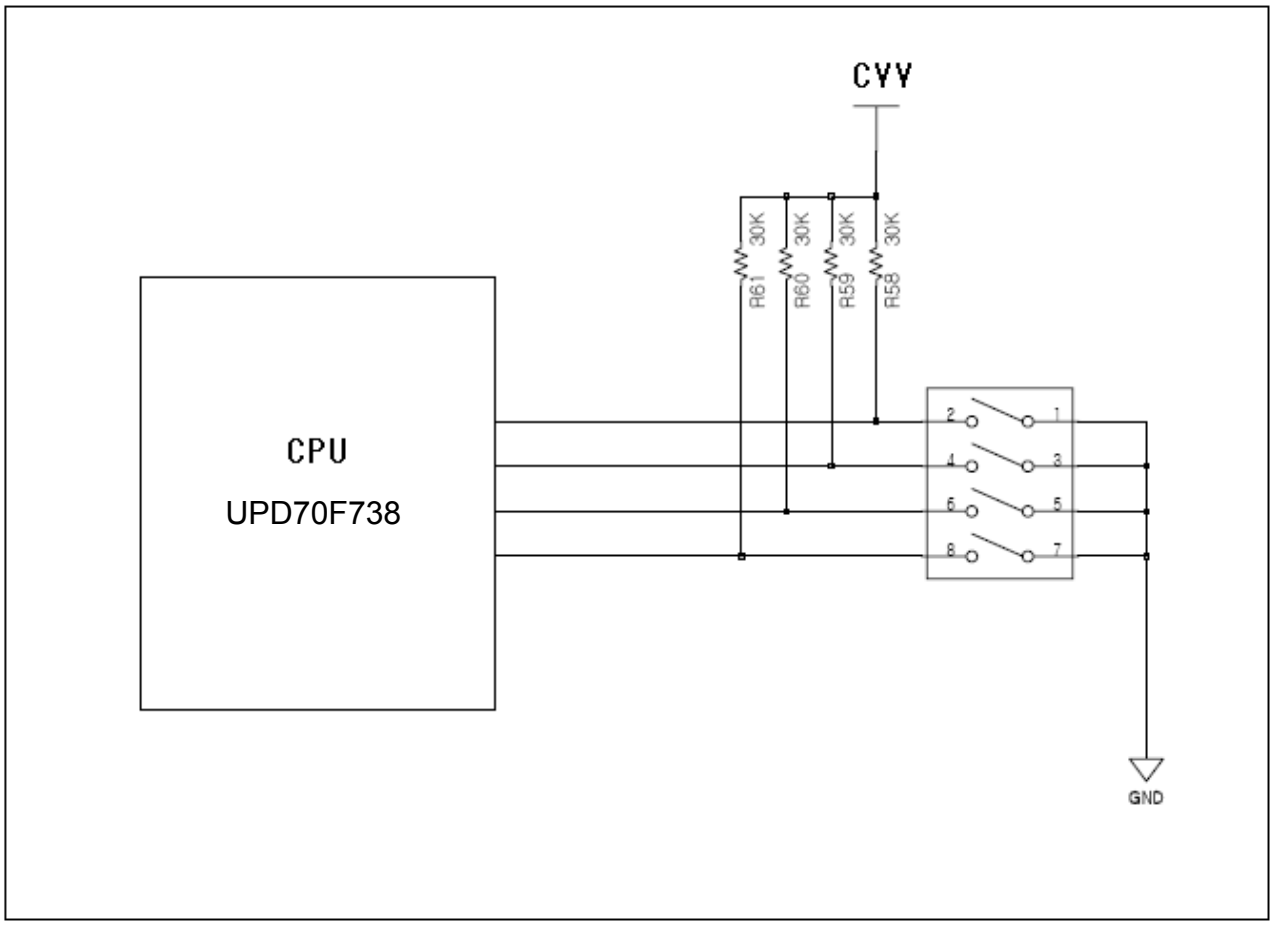


Figure 4-3-7 USB Communication Block Diagram

4-3-8 Thermal Printer Head Circuit

First, the CPU sends a Serial Clock and Serial Data 384Bits(48byte) to the Shift Register of the Thermal Printer. The Serial Data are stored to Shift Register in the Thermal Printer.

STB No.	DOT No.	DOTs/STB
STB1	1 ~ 64	64
STB2	65~128	64
STB3	129~192	64
STB4	193~256	64
STB5	257~320	64
STB6	321~384	64

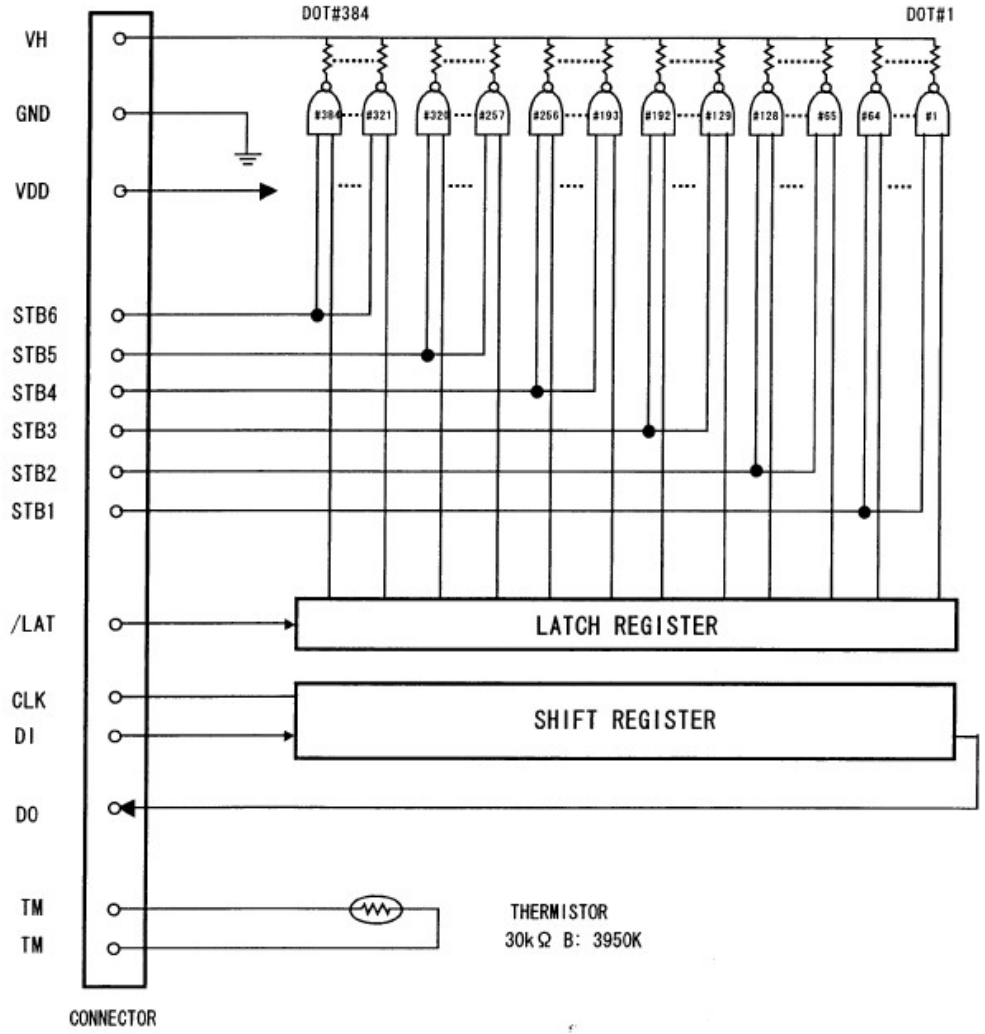


Figure 4-3-8-1 Thermal Printer Block Diagram

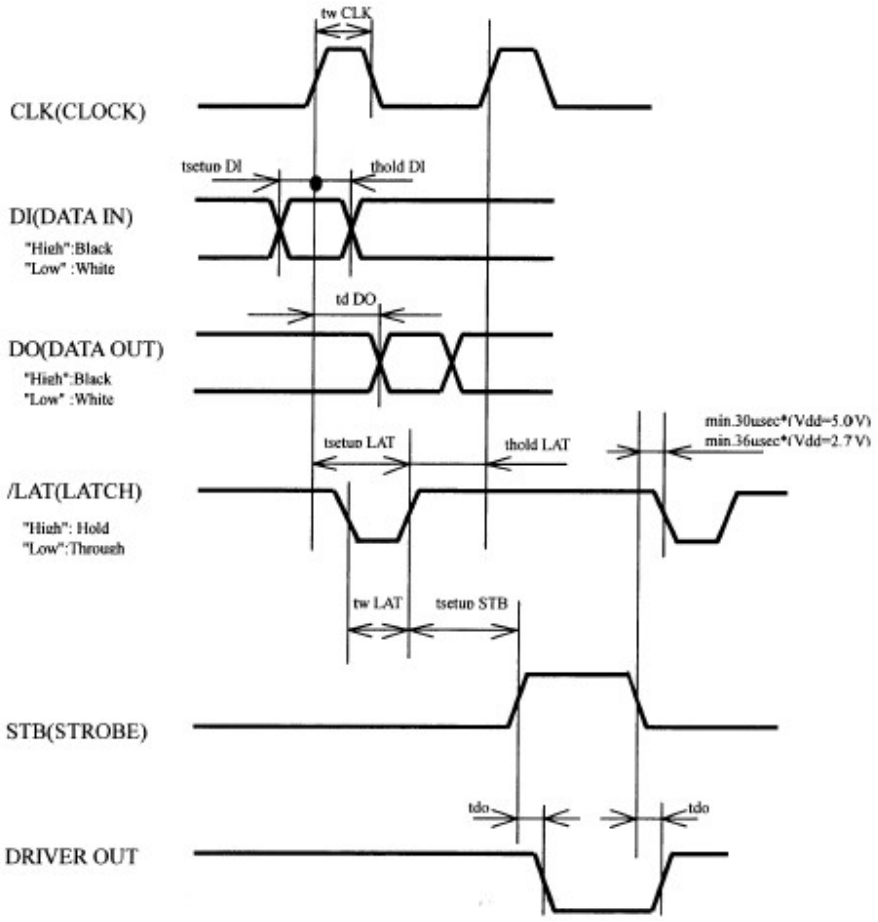
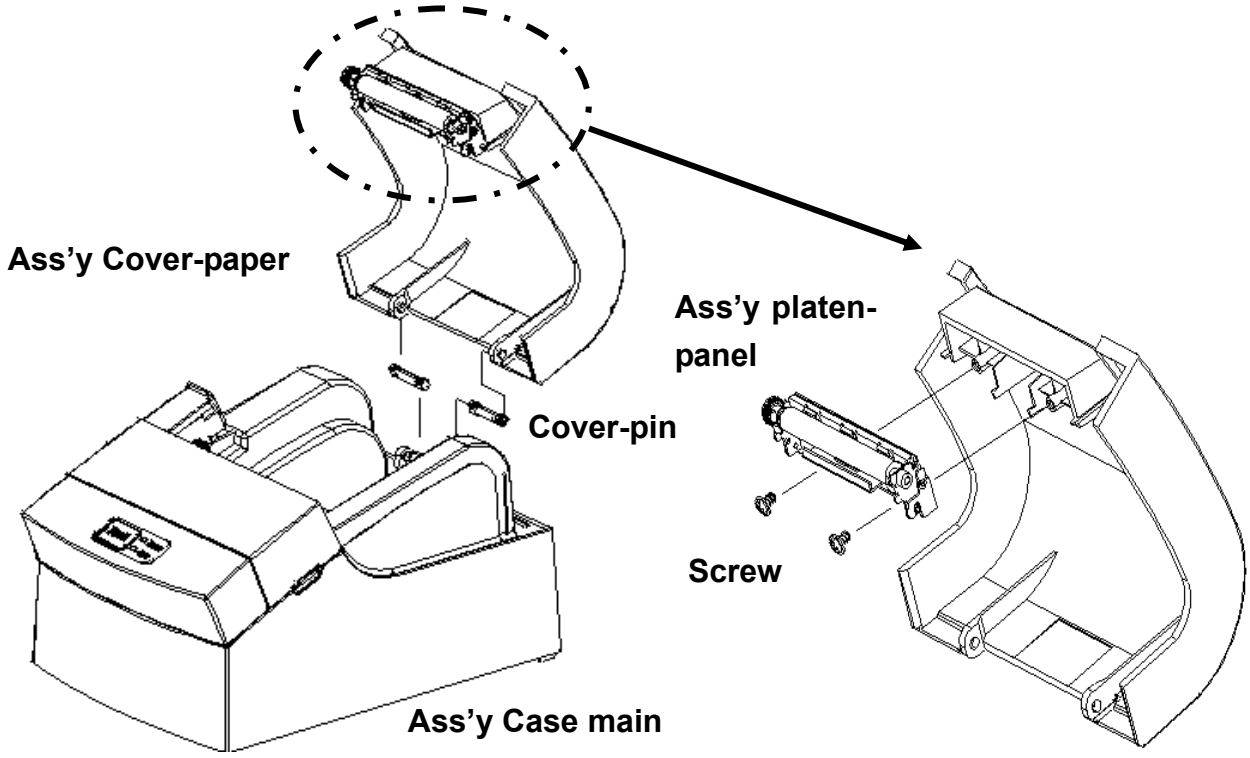
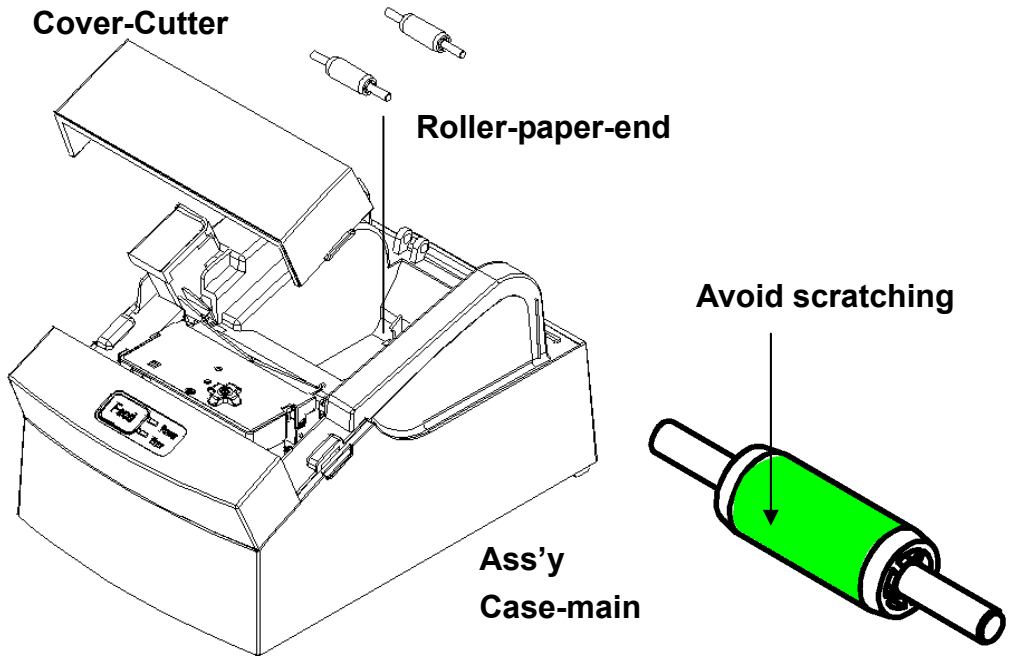


Figure 4-3-8-2 Thermal Printer Timing Waveform

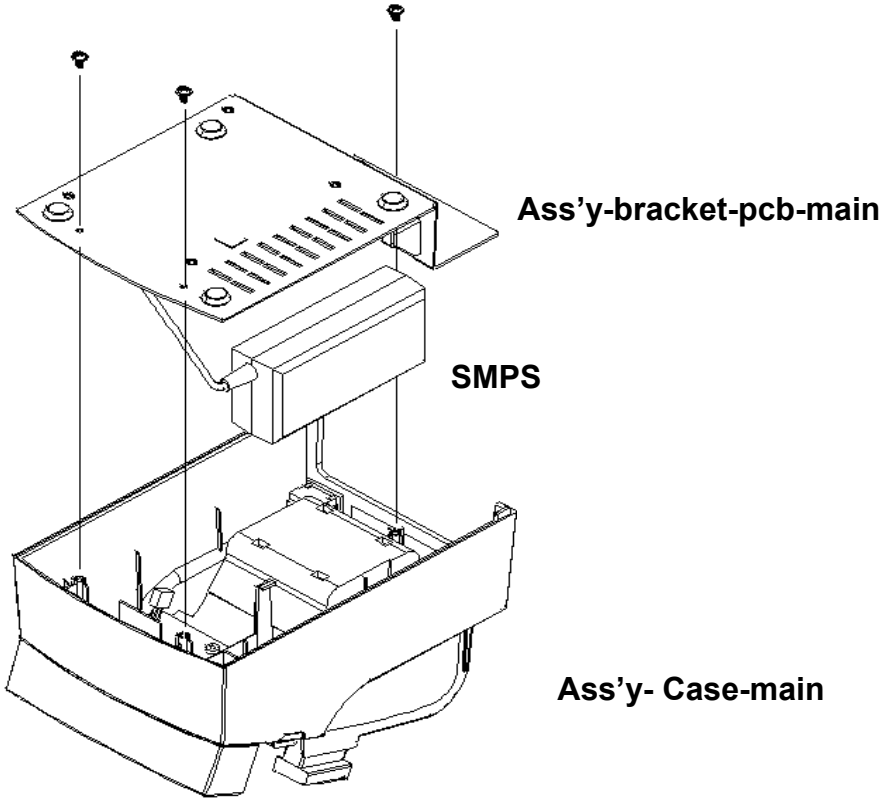
5. Disassembly and Assembly



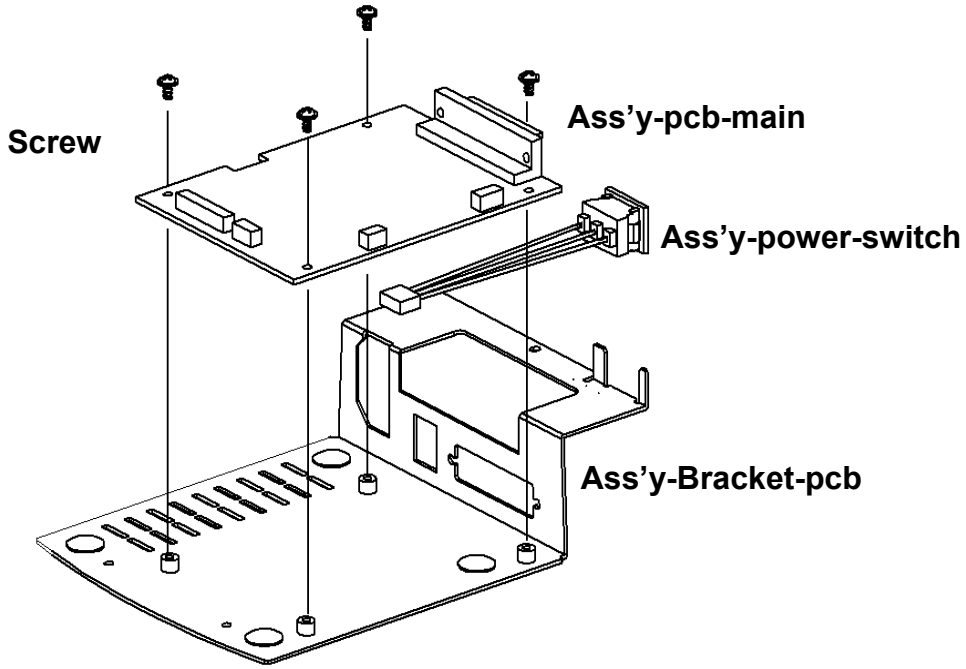
1. Remove two cover pins.
2. Remove two screws from the Ass'y cover-paper and separate the Ass'y platen-panel.



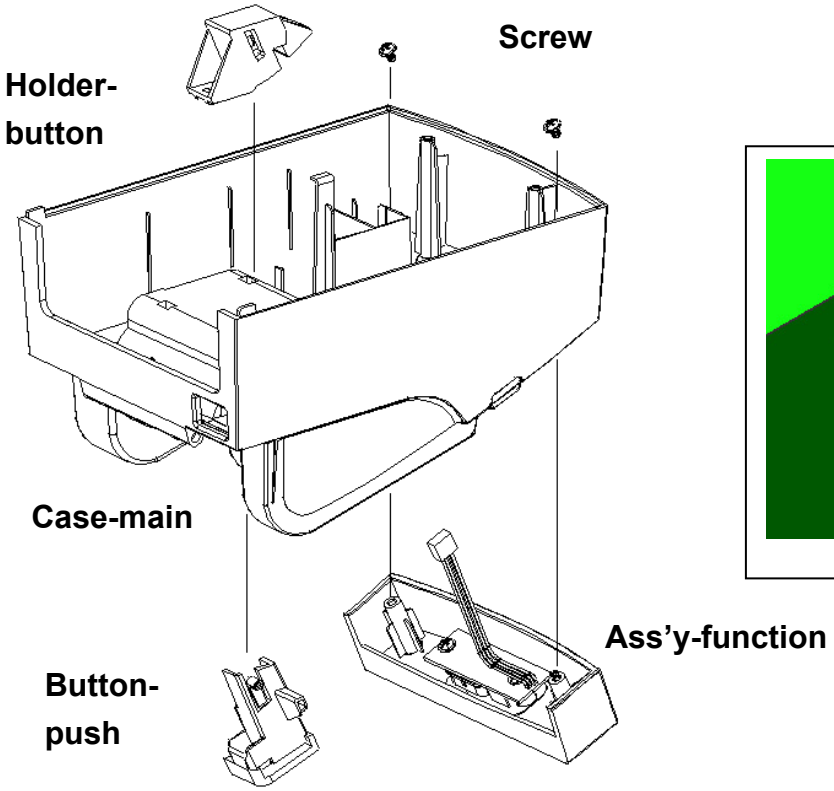
1. Separate the cover cutter.
2. Separate the roller-paper-end from the Ass'y-Case-main.
   - Take care not to scratch the surface contacting the paper while separating them.
   - Scratches on the roller will cause scratches on the paper.

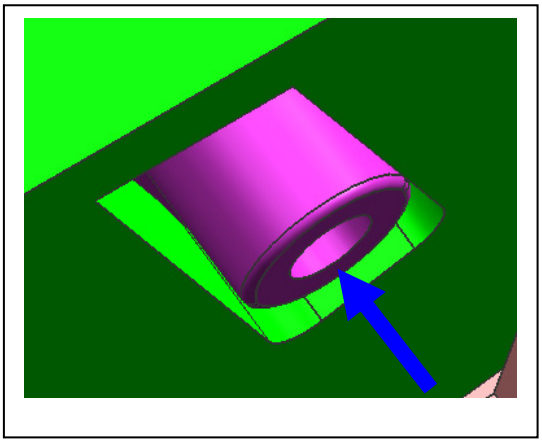


1. Remove three screws.
2. Remove the SMPS & Ass'y-bracket-pcb-main from the Ass'y-Case-main.
   - Take care not to damage or cut wires while separating the FPC and connectors connected to the board.

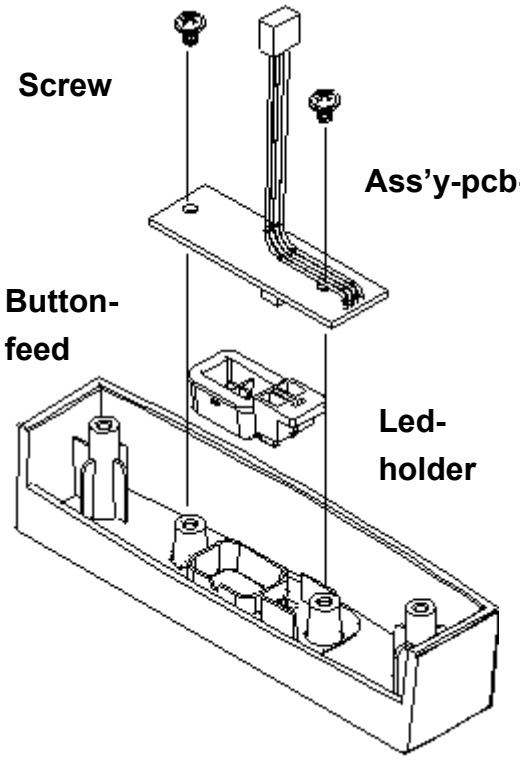


1. Remove four screws.
2. Separate the Ass'y-bracket-pcb from the Ass'y-pcb-main.





1. Remove two screws.
2. Separate the holder-button and button-push from the case-main.
   - Push the boss part of the button-push in the direction of the arrow shown in the picture to easily remove it.



1. Remove two screws.
2. Separate the parts including the Ass'y-pcb-function.
   - Care must be taken while assembling the button-feed as it must be assembled in the right direction.

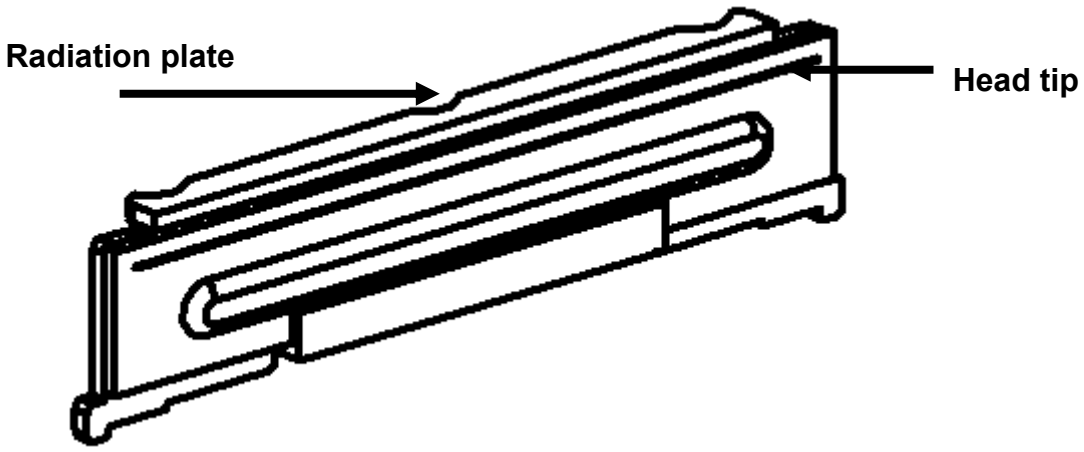
6. Maintenance

6-1 Maintenance

Paper dust in the heating elements may lower the print quality.
In this case, clean the print head as follow;

※ **Caution:** Turn off the printer power before cleaning.
※ **Caution:** Note that the thermal head (Thermal element and Radiation plate) becomes very hot during normal operation, creating the danger of burn injury. Be sure to wait for about 10 minutes after turning printer power off before beginning the cleaning.

1. Open the cover-open.
2. Clean the thermal element (the area that looks like it is marked a thin black line) of the thermal head with a cotton swab moistened with an alcohol solvent. (ethanol, methanol, or IPA)
3. After confirming that the alcohol solvent has been dried up completely, close the cover open.



※ **Note:** Never touch the thermal element with your hand.
Doing so can damage the thermal element.
※ **Note:** Do not scratch the printer head.

7. Troubleshooting

This chapter describes the methods for troubleshooting in this Receipt Printer.

7-1 Power Problem

If a problem that can be verified by visual examination has occurred, use the tables below to determine the cause and perform repairs.

There are four tables, divided by symptom category :
• Initialization Problems
• Printing Quality Problems
• Printer Mechanism Problems
• Auto cutter Mechanism Problems

The tables contains the following columns :
• Problem
This is the symptom that can be verified.

• Problem Causes
This is a listing of one or several possible causes that should be examined.

• Level
- Level A
The problem can be corrected by persons who are familiar with the printer and have general knowledge, but special technical skills are not required.
- Level B
The problem requires thorough knowledge and familiarity with the printer as well as technical skills and experience.

• Checkpoint
These are one or more areas in the printer that should be checked.

• Action
These are the steps to correct the problem. If the problem persists after taking these steps, check the other possible causes listed.

Printing quality problems

Problem	Probable Cause	Level	Checkpoint	Action
Certain parts are printed in white lines vertically	Foreign substances on the surface of the head	A	Check the foreign substances on the head surface	Remove the foreign substance using cleaning pen
	Surface of the head is damaged	B	Check the damage to the head surface such as dents	Replace the head
	Internal IC of the head is damaged	B	Damage to the internal IC of the head	Replace the head
	When there is a vertical scratched trace on the paper	A	Check whether there are obstacles such as bumps in the path the paper moves	Remove the obstacles
Certain parts are printed in black lines vertically	Damage of the internal IC of the head	B	Damage to the internal IC of the head	Replace the head
Horizontal black lines are generated, or the vertical width of the characters is reduced	Irregular feeding	B	Check the damage to the gears and foreign substances in the gear profile.	Replace the gears or remove the foreign substances
	Feeding motor failure	B	Check whether the motor runs smoothly without friction.	Replace the motor
	The roller does not rotate smoothly	A	Check whether sufficient oil remains in the bearings holding the roller.	Fill the oil in the bearings
Overall printing density is low	The roller and the head are not attached properly.	A	The cover is not completely closed.	Open the cover and close it again completely
	The spring pushing the head is not strong enough	B	Check whether the screws holding the spring are loose.	Fasten the screws
	The head surface is damaged	B	Check the abrasion on the head surface.	Replace the head

Printer mechanism problems

Problem	Probable Cause	Level	Checkpoint	Action
Paper feeding failure	Feeding motor failure	B	Check the short circuit failures inside the motor	Replace the motor
	Gear is dislocated from the rotating axis	B	Check the assembly status of the washers holding the gears	Reassemble the gears and washers
	Paper jam occurs	B	Check the paper jam	Open the cover and remove the jammed cover
	Auto cutter jam occurs	B	Check the auto cutter jam	Open the cutter cover and turn the knob to put the blades back to the original position
The cover cannot be opened by pressing the OPEN button	Auto cutter jam occurs	B	Check the auto cutter jam	Open the cutter cover and turn the knob to put the blades back to the original position
Cover cannot be closed	Deformation of the hook	B	Check the deformation of the hook	Straighten the hook with the pliers
Error LED is on while the printer is in ready state	Cover open sensor failure occurs	B	Check the failure of the sensor	Replace the sensor Ass'y
Error LED is on while the printer is in ready state	Paper end sensor failure	B	Check the sensor failure	Replace the sensor Ass'y
Jointing or bouncing sound during feeding operation	Damages or foreign substances on the gears	B	Check the damage or foreign substances on the gears	Replace the gears or remove the foreign substances
Entered characters and printed characters are different	Check the communication speed	A	Set the communication speed with DIP switches in case of serial mode	Check the DIP switch setting
	Communication cable failure	A	Check RS-232C null modem cable	Replace the cable

Auto cut mechanism problems

Problem	Probable Cause	Level	Checkpoint	Action
Auto cutter does not work at all	DIP switch setting failure	A	Check whether the DIP switch 1-1 is ON	Change ON setting to OFF